



MIND

A QUARTERLY REVIEW

OF

PSYCHOLOGY AND PHILOSOPHY.

I.—LAURA BRIDGMAN.

IN 1837 a delicate light-haired girl, nearly eight years old, who at the age of 26 months had lost sight, hearing, and to a great extent the senses of smell and taste, from an attack of scarlet fever, was brought from her rural home in New Hampshire to the Perkins Institution for the Blind in Boston. During her long illness all recollection of her babyhood had been completely effaced. Her parents had communicated with her by the simplest signs addressed to her only sense of touch. A pat on the head expressed approval, on the back disapproval. She had been taught to sew, knit, braid, and assist in trifling ways about the work of a farmhouse. Dr. Howe began her instruction by pasting on common objects—chair, spoon, stove, &c.,—their names printed in raised letters. After she had associated the name and the object the labels were taken off, and she was taught to select the object for a corresponding name and *vice versa*. After a few days, when she had thus learned a small number of names and objects, Dr. Howe gave her a pin and a pen and made her feel his hands as he spelled from *disconnected* letters the two corresponding words. After repeating this process scores of times she suddenly seemed to understand that the signs were complex and must be observed separately, and at last she was able to select from a pile of letters those which spell 'pin' or 'pen' according as one or the other object was given her

This was an immense step. She was now easily taught the names of many other things and to set up types of raised letters, and impressing them upon paper to produce a copy which she could read on the reverse side. After nearly two years of such exercises she was taught words indicative of quality, as 'hard' and 'soft,' and, later, moral qualities, commencing with the figurative use of the words 'sweet' and 'sour,' which as tastes she could slightly distinguish. It was difficult to explain to her why these should precede the substantive, and especially so to make her understand general or abstract expressions of quality, as 'hardness,' 'softness.' Next she was taught words expressive of simple space-relations 'on,' 'in,' 'under,' &c., and later and very easily the use of verbs expressing tangible actions, as 'walk,' 'run,' 'sew,' first in the present indicative and then in other moods and tenses. Instruction in writing which began at this point was at first very puzzling to her, but when she suddenly caught the idea that thus she might communicate with persons whom she did not actually touch, her enthusiasm was great and her progress rapid. Counting, the divisions of time, the simple rules of arithmetic, and, later, fractions and the computation of interest, the elements of algebra and geography, &c., she has been able to comprehend quite clearly.

We have no space to epitomise further the history of her education contained in Dr. Howe's Reports,¹ unfortunately now mostly out of print. His work was so ingenious and successful that it still remains one of the greatest triumphs of paedagogic skill, and his studies of his pupil during the most interesting period of her education may be called almost classical for the psychologist. Few princes have had more devoted pains bestowed on their education. Besides Dr. Howe's personal and constant supervision, an accomplished lady-teacher, who has lately published an interesting sketch of Laura's Life and Education,² was engaged for years expressly for her. Laura's curiosity has always been boundless, and she is so demonstrative and affectionate, and so pitiable from the afflictions which have made her famous, that the number of her personal friends and acquaintances has become surprisingly great, while not a few ladies have learned the deaf and dumb alphabet mainly in order to converse with her. The philanthropic interest of Dr. Howe in his pupil (whom he described as living in isolation from all that is best in the intercourse with men and nature, as if at the bottom of a deep well striving to grasp the slender

¹ The last Report, issued just before Dr. Howe's death, was reprinted in MIND II., pp. 263-7.

² *Life and Education of Laura Dewey Bridgman.* By MARY SWIFT LAMSON. Boston : N.E. Pub. Co. 1878.

cord by which he at last slowly drew her up into the world of human fellowship) was contagious, and thirty years ago his annual reports of her progress were translated into several European languages and read by thousands with an interest and a sympathy which has been described as creditable to humanity. Her native modesty and conscientiousness, her remarkable cheerfulness and love of every sort of sport and play which she can understand, scarcely less pronounced now in the woman of forty-nine than it was in the girl of sixteen, the amazing rapidity with which she comprehends and uses the deaf and dumb alphabet (sometimes receiving through the hand of an expert teacher every word of a public address as it is given with the loss of scarcely a letter), the decided enlargement of her head in the frontal regions during the early years of her education, her dreams in the finger-language, her curious and expressive vocal sounds, gestures, and facial expressions, the readiness with which she remembers old acquaintances after the lapse of years by the mere touch of the hand,—these and many other facts have been cited and commented upon by scores of writers until it is hardly extravagant to say that comparatively few comprehensive treatises in any department of mental or moral philosophy or psychology written in Europe or America during the last quarter of a century can be found without the mention of her name. Her education has of course always been chiefly in language; yet, like all the blind, and still more those who are both deaf and blind, she is quite nominalistic in her modes of thought, and by no means a mere parrot or word-monger. A word to her, though not a mere *status vocis*, is yet only a representation of something definite, specific, and for the most part tangible. It has been often conjectured that intensity and range of emotion depend in some measure upon the intensity and range of the voice, the mobility of the features, &c. The capacities of the hand, physiologically the most objective part of the body, are so different as an organ of expression from those of the larynx that, if this be at all true, we can see here an additional reason why her strange consciousness is at every point so like yet so unlike our own, that we might compare the two as Mr. Herbert Spencer conceives things *per se* may be related to our perceptions of them, *viz.*, as solid objects casting their shadow upon a cylindrical surface where lines and angles are all represented, but in such changed relations and proportions that there is an element of incommensurability between thing and thought at every point.

For years Laura was encouraged to write down every day her experiences, acquisitions and reflections, and her teachers were also in the habit of keeping a diary of her progress. She has

also at different periods of her life written three "autobiographies," two of which are mainly devoted to the recollections of child-life at home. She has had quite an extensive correspondence and many of her letters have been collected and preserved by friends. Unhappily very little of this copious material except her own diary and the reports of Dr. Howe has been used by Mrs. Lamson in her recent sketch. Through the kindness of Dr. Anagnos, the successor and son-in-law of Dr. Howe, it was all placed in the writer's hands; and the hospitality of the Perkins Institute for several weeks, together with all needed assistance and information, was generously offered for further observation and experiment. A preliminary sketch of some of the methods and results of these it is now the object of the present article to give. Most of Laura's life has been passed in an atmosphere of womanly sympathy, and the question whether or not she should be submitted to the trifling inconvenience necessary to any psychophysiological study of her sensations, which may seem to some to bring humanitarian and scientific motives in conflict, appears quite impertinent when we reflect that perhaps no person living owes more to the kindness of her fellow-beings, and that few are less able to repay it otherwise.

During the first twenty-six months of her life, before the illness in which the contents of her eye-balls and ears were discharged by suppuration, she is described as a somewhat precocious child with light blue eyes and an almost morbidly active and sensitive temperament, who had already learned a larger stock of words than most children of that age. Very many adults remember distinct events before the beginning of their third year, and several well-authenticated cases are on record of those who became blind from the sixth to the eighth year, and whose memory of visual conceptions and colour-sensations has persisted through adult years. After carefully questioning her mother and other relatives who have always been interested in these questions, and after several short series of indirect and scores of direct questions addressed to Laura herself with the request that she would "think hard" and answer in writing the next day, and after examining the three "autobiographies" in which she has at different periods of her life striven to recall all traces of early recollections, no reason can be found to believe that any thing whatever previous to the long convalescence which extended from her third to her sixth year has remained or can ever be recalled to her memory. Yet, when we reflect on the amazingly rapid self-education of infantile life through the senses and its fundamental nature, it is impossible to believe that its effect can ever be entirely obliterated. In fact we may recognise in Laura's strange and insatiable curiosity, especially

about things which others see and hear, as well as in the suddenness with which insights have so often seemed to break in upon her mind, some sort of sub-conscious reminiscences flashing through the sad background of her childish recollections.

Of the next period of her life, extending to the end of her eighth year, when her education commenced, her memory has always been wonderfully full and complete. In the "autobiography" of 1854 more than forty large and finely written pages are devoted to this period, and a comparison of this with the others, and with her answers to questions based on their contents, shows that she is able to recount still additional details. There is every reason to believe that these are veritable recollections, and that they are not confused with accounts of her childhood rehearsed to her later by parents and friends. She seems to have taken the greatest pleasure in recalling and reflecting upon her early life from the higher standpoint of her *articulate* consciousness, and in recording the events in her quaint and latinistic style. She remembers that she "often subsisted upon many sorts of berries with most luxurious milk in the summer"; how she loved to "reach a great abundance of sour and sweet apples suspending on the branches of the trees"; how "I enjoyed myself exceedingly in observing her [my mother] spin, weave and wind yarns, and doing other things exceedingly," and regretted that "I could not perform the latter for it seemed prodigious"; how much "difficulty it yielded me to make myself understood"; how in a fit of passion "I rejected the poor cat vehemently into the fire". "I was intimately acquainted with my grandfather, who was my male parent's father." She describes the capes, ruffles and bindings of her dresses and those of her friends; tries to explain the process of making candles and soap; remembers pounding up beetles and caterpillars in her mother's mortar, how she used to dress up a boot as a doll, her adventures with domestic animals, her sports, occupations, punishments, medicines and presents, the wrinkles on the hands and faces of her friends, the slender stock of signs by which she communicated with others, and how she strove often vainly to make her wants understood; and pauses occasionally in the narration to wonder at and deplore with a sort of self-pity the ignorance of her early life, or to apologise for that of a quaint old bachelor-friend, who was very kind to her. Her psychical processes during these years, complex as they were, went on and were remembered entirely without the aid of language, which differs from other series of gestures only in being more explicit and capable of development, and in introducing into or imposing upon conscious thought a new logical order. Gesture in general has been described as a language of roots still

more primæval than those which philologists seek to determine. Like articulate speech, it is a reflex of apperception, and is demonstrative or predicative, may be very express, or may be reduced to the slightest terms of motor innervation, and has its own distinct syntax, determined perhaps for the most part, as Geiger believed that of oral language to be, by the order in which phenomena affected and interested the sense of sight. Hence in these memoirs of her early life, Laura merely translates a less into a more perfect series of reactions and innervations—a process which probably does not differ so much from the case of a normal adult recalling and reflectively recording his earliest recollections, as language through the fingers and their cerebral centres differs from language through the vocal organs and the island of Reil. At least it will be admitted that Laura's education at first revealed quite as much as it created intelligence, and we must wonder at her remarkable endowments, while we none the less admire the ingenious method by which she was saved from a life of isolation, which would otherwise almost certainly have ended in morbid irritability, melancholy, and finally in insanity or idiocy.

It has been often asked whether she is absolutely deaf or blind, and what is the present condition of her ears and eyes? The eminent Boston aurist, Dr. Clarence J. Blake, who kindly consented at the writer's request to examine her ears, reported as follows:—"Both external ears normal. The right external auditory canal normal in size and contour, and the skin lining the passage healthy and showing no marks of previous inflammation-processes. The right membrana tympani was entirely destroyed with the exception of a narrow rim, the remains of the inferior and posterior portions of the membrane, from which a thin cicatricial tissue extended inward to the promontorium over the stapes and fenestra rotunda. The malleus and incus had disappeared. The mucous membrane of the tympanic cavity presented a normal appearance with the exception of one spot on the promontorium covered with a thin crust of dried secretion about two millimetres in diameter. A band of thin cicatricial tissue also extended across the anterior portion of the tympanic cavity. The left external auditory canal was filled with dark brownish cerumen, on removal of which the passage was found to terminate at a depth of two centimetres in a diaphragm of secondary granulation-tissue completely closing the canal. This diaphragm was concave, very firm, and resisting gentle pressure with a probe, except at the central or thinner portions, where it could be slightly depressed. Its outer covering was continuous with the dermoid lining of the canal." The tests of her sensations of sound were made first with a tuning-

fork, with movable clamps and set in vibration by a spring hammer. The stem of the fork was placed between her teeth (false) and pressed against an ordinary telephone-disc, resting successively upon each mastoid process, over the forehead, at the junction of the frontal and sagittal sutures, over the vertex and the occiput. Heavier tuning-forks were afterwards used in the same way, and also in connexion with a series of Helmholtz resonators, the points of which were introduced into the ear (for the use of which and other physiological apparatus the writer was indebted to the kindness of Professor H. P. Bowditch). The most piercing tones of König's rods and the deafening noise produced by slipping the moistened fingers over the end of a toy telephone, one mouth-piece of which covered the external ear, were tried. A large pasteboard trumpet, like those of a megaphone, though smaller, fitted to the osseous socket of the ear, such as has been so useful in some cases of deafness, was used; and finally electrical irritations were applied to the external ear and sent through various parts of the brain. But all in vain. Once or twice her feeling was described as "like singing" or "as if some one was speaking," but it was generally very certain that her only sensation was that of vibration or jar. Her sensitiveness for the latter is very acute. She commonly describes herself as hearing "through the feet". In this way she distinguishes not only the step but sometimes even the voice of her acquaintances.

From a rough preliminary experiment it would seem that she is able to distinguish a musical interval of somewhat less than an octave by the sense of touch through the end of the index finger of the right hand, and yet this sense does not appear to recognise sonorous vibrations of less amplitude than normal persons can do in the same way; thus, although she lives in an absolute stillness, which, according to the speculations of Preyer, a hearing person can never even for an instant attain, she attaches a very definite meaning to the words 'sound' and 'hear'. She also feels of course the vibrations in her own throat when she makes her "noises". With sensations which in this respect are perhaps scarcely above the average, she is able, without the distractions which continually enter through the normal ear and eye, to concentrate attention upon the meagre data until she has developed a set of perceptions and conceptions so little incommensurate with the ordinary auditory consciousness that they do duty for it to a surprising though still slight extent. Of the physiological basis of this sense of vibration or jarring almost nothing is as yet known. It appears to have some of the characteristics of a distinct and specific and some of a generic sense. Investigations already begun in one of the German laboratories may increase our knowledge of its nature.

If oscillations as such can be directly felt, then the most generic fact of the physical world enters consciousness immediately without passing any "inconceivable chasm".

Dr. O. F. Wadsworth, an accomplished oculist of Boston, who kindly consented to examine her eyes, reports as follows:—"On both sides the lids are sunken, partly on account of lack of the normal amount of orbital fatty tissue. Partly on account of the small size of the eye-balls, they remain constantly closed. The right conjunctival sac is much smaller than normal, somewhat irregular, and presents an appearance such as is seen after severe and long continued inflammation. The right eye appears about one-half the normal size. It is wholly enclosed by the sclerotica, except over a space at the centre some two millimetres in diameter, where a less opaque tissue on which a few blood-vessels are visible represents the altered remnant of the cornea. The left conjunctival sac is somewhat larger than the right, and more regular, though still small. The left globe also is a little larger than the right, and its opaque altered cornea is some four mm. in horizontal and two mm. in vertical diameter. There was constant irregular oscillation of the globes (nystagmus) whenever they were exposed to view by raising the lids, and the oscillation evidently continued even after the lids were closed." Possibly this was due in part to the excitement of the visit. The sensitiveness of the eyes was still further tested by a ray of sunlight directed to each ball (after the lids had been raised) from a heliostat, and gradually concentrated until the point of almost painful heat was reached; but with no trace of any but a slight "stinging" sensation in the left ball. Gentle pressure and electrical irritation applied both to the orbits and directed through the visual centres produced no effect whatever. During her childhood at home she was just able to distinguish lights and windows in a room and (her mother thinks) to recognise people dressed in white, but these sensations were so feeble that she seems almost never to have utilised them in directing her motions; and even these seem to have been lost soon after she went to the Asylum. She has always, however, especially in bright sunlight, complained of a slight "pricking like needles" in the left eye. Partly for this reason, but chiefly to cover the shrunken globes, she wore constantly for many years a band of heavy green silk bound over both eyes. It is thus manifestly impossible that any, unless it be the most rudimentary, visual impressions can have directly entered as factors into her intellectual development. Hence her notion of colour is even more purely conventional than that of sound. She remembers having learned that mosquitoes, the wind, certain animals, and impacts make a noise, but did not know, or had forgotten, that

flies, running water, rubbing the hands, &c., did, and was uncertain about many other things. So she remembers the names of the colours of her dresses, flowers, sky, grass, blood, and often insists that certain garments are too light for winter or too brightly coloured for one of her age. All this, however, is merely conventional and verbal. She has never formed any mental conception of what colour is or is like, as do so many of the blind. It was never in her mind identified with or even analogous to any notion or sensation of sound, smell, taste, or touch, as with so many who have only some or all of their senses.

Whether from her conceptions of space-relations the influence of previous visual impressions has been entirely lost is one of the most difficult and important questions. She is far less "blind-minded" than many of the congenitally blind, yet she forms conceptions of aggregates with difficulty. She knows that her room is square, but is not certain that the house is so. She can form a very poor image of how the grounds with which she is perfectly familiar would look from a house-top, has a very poor notion of perspective, knows very little why or how much objects look smaller at a distance, and is unable to tell without much reflection how many sides of a hexagonal column can be seen from one point of view, though she has learned well that rays of light move in straight lines. In spite of her wonderful powers of recalling past sensations, even those of her childhood, she remembers nothing of seeing, though it is quite impossible to believe that the very many and complex motor reactions and co-ordinations which a bright child learns by means of this sense before the age of two years can have been entirely lost. These, and not the small though essential factors of sensation, constitute education in its enduring results. She turns the head but very slightly in the direction in which her attention is excited, but invariably extends one hand. The irregular motions of the remnant of her eye-balls have also no psychical significance. But the occult effects of the early possession of vision are to be found, if at all, in her wonderful memory for forms and in her perpetual craving for a fuller and larger knowledge than it is possible to convey to her, which rises at times almost to question-mania [*Grübeltsucht*]. Even on the basis of the Berkeleyan theory it would be expected that a knowledge of the external world derived through touch and muscle-sense alone would be more *serial* than where the broader and more rapid perceptive processes developed through the visual centres come in, to review, epitomise and extend impressions from without. The question also arises whether a person with for years only a very vague sense of intense light and using this to anticipate tactile impressions, *e.g.*, to avoid the fire and go towards the window, &c.,

would not get through the eye a better because far more serviceable idea of the third dimension of space than of the other two.

The inflammation of the olfactory mucous membrane during her long illness was severe, and the sense of smell was almost entirely lost, though it has slightly improved with advancing years. She has never had the habit which so many blind persons acquire of testing objects by applying them to the nostrils. There is however no deformity or scarification observable without or from a cursory examination within the nose, and the yellow pigment of the schneiderian membrane can be faintly seen by a simple apparatus. According to the very questionable hypothesis of Dr. W. Ogle, this sense might from the first have been rudimentary in a person of her complexion. Her mother, however, does not remember to have noticed during her infancy either the presence or absence of this sense, although the latter would probably have been more conspicuous. At present she loves to smell flowers, and can distinguish a few of the more fragrant varieties. Eau-de-cologne, ammonia, onions, tobacco-smoke, were recognised and distinguished only when quite strong, and the same was true of aromatic flavours. In losing the sense of smell, in some respects the most delicate and the most wonderful (perhaps because the least known) of all the senses, she is deprived of a means of communication with the objective world of the greatest importance to one in her condition. Julia Brace and other blind deaf-mutes have been able to sort the freshly washed clothes of the inmates of a large asylum, and to select and give to their owners several dozen pairs of gloves thrown promiscuously upon a table, solely or mainly by the sense of smell. A hasty experiment with Laura to determine whether smell was more acute in inhalation or exhalation was without result. The sense in both nostrils is about equally intense, and once when eau-de-cologne was applied to one nostril and tobacco to the other, she recognised both. Whether this was done more or less readily than would have been the case if the odour of both had been inhaled with equal strength by both nostrils at the same time seems by no means certain.

Taste is not so much a single sense as a plexus of senses. To sensations of cool, biting and astringent substances, pepper, alum, &c., located in the gums as well as in other parts of the mouth, she is very sensitive; to flavours perceived in the nasal cavity far less so; and of the four tastes proper she seems least sensitive to bitter and sour, most so to sweet and salt; while the observation that the base of the tongue is most sensitive to the first of these tastes, the sides to the second, and the point to the third and fourth appears to have partial verification in her case. She also experiences the peculiar taste caused by

electrical stimulation; she is however very far from being indifferent to the kind and quality of her food, but satisfies the very moderate demands of her appetite with a deliberate and almost epicurean discrimination, which suggests the existence of what Professor Bain describes as sense of relish, quite apart from taste proper, and felt perhaps most keenly just as food is leaving or just after it has left the region of the voluntary and entered that of the involuntary muscles of deglutition. The circumvallate papillae have about the same superficial appearance as on an ordinary tongue, perhaps smaller but scarcely less numerous. Both this sense and smell have a strange intermittency, which resembles that of the higher senses and of the intelligence itself in many forms of nervous and mental disease. In making the above observations, both, especially taste, after being considerably acute for several minutes, often seemed suddenly and unaccountably to vanish and no trace of sensation could be observed under very strong stimulus. It would be very interesting to know what sort of a curve of fatigue, if any, such modifications of sensibility follow. It may be analogous to the speedy rigidity of the hand in contact with the cathode when a strong galvanic current is sent through both arms, in Ritter's well-known experiment which Pflüger has so ingeniously explained.

From the above we feel justified in inferring that the lesions of each of the four defective senses were primarily peripheral and so complete that none but taste has essentially contributed in developing her consciousness of the external world, while the functions of the centres, already somewhat unfolded though so slightly localised as they are in children of two years, adapted themselves with less than usual loss of power to their new and unfavourable conditions. The time for such a four-fold affliction was perhaps the most favourable possible. Had it fallen earlier the physiological development of the centres might have been still more dwarfed and the impulse toward mental growth still feebler; had it come later, together with a possible diminution of vicarious and adaptive power, the memory of loss would have perpetually saddened her now exceptionally happy and buoyant spirits, and she would never have been able to forget, as she seems completely to have done, that what others know as a manifold objective world she is doomed to perceive only as a play of shadows across the narrow field of a single sense. The time of her discovery by Dr. Howe and the beginning of her education at the age of eight seem also very opportune. She had had time to recover from her long illness, and to learn much about things concerning which she had already begun to feel a strong and ungratified curiosity.

Her desire at one time to have a mirror in her room, the pleasure she experiences in feeling a little music-box as it plays in her hand, her love of having perfumes and of eating things like certain jellies, farina, &c., which can have little or no taste to her, have been called affectations, but are inevitable results of association with normal people. An *esprit de corps* is as unfortunate among defectives as among prisoners. Among the blind or deaf Laura has had comparatively few acquaintanceships, considering that so much of her life has been passed at an asylum. Only the case of the mirror can be called pure affectation, while even her "taste" of jellies seems largely due to the purely æsthetic feelings of touch in the mouth. Wundt's ingenious theory of facial expression, *viz.*, that it originates in movements calculated to modify vision, smelling, taste, and in part hearing, is not favoured by observations on Laura. True, she does not open the mouth in the ordinary way to indicate great attention or surprise, and the upper part of the face and forehead, as compared with that of most of the blind, is quite immobile; but she can hardly have learned to draw the lips and cheeks toward either side away from the gustatory surface of the edges of the tongue because sour is tasted there. Nor can the mimesis of her nostrils be explained without making large drafts upon the principle of heredity. All the lower part of her face is extremely mobile and expressive, as with most of the blind, in spite of constant effort on the part of her teachers to check unpleasant excesses. Lack of sympathy and cruelty have been observed as frequent characteristics of the deaf, and are no doubt due largely to the fact that human sentiments and all the finer feelings and emotions are mainly conveyed through the voice: no one however can doubt, despite the several instances of cruelty recorded of her childhood, that Laura's nature is unusually sympathetic. She often fails to understand readily the feelings of others, but when they are made clear, the response is far too quick and hearty to be for a moment considered as merely conventional.

Local discriminations through the skin are developed with remarkable and in some respects unprecedented acuteness. Discrimination of peripheral sensibility in a normal person ranges from about 68_{mm.} between the shoulders, to '0005_{mm.} on the *fovea centralis* of the eye. (If we mentally construe all these forms and degrees of sense into terms of touch, as they may perhaps primitively have been, we shall be able to conceive how great is Laura's disadvantage in communicating with the external world.) Now it is well understood that of Fechner's methods of measuring sensibility that of the *average error* gives the lower, and that of the *just observable difference*

gives the upper threshold-value, while that of the *right and wrong cases* gives results which fall near the middle of the thus quite extended threshold. In choosing the second of these methods it is desirable that the series of measurements be a descending one: *i.e.*, the points of the pair of compasses must be gradually approximated till the sensation of two points gives place to that of one. In this way the threshold-value is less than if the series be reversed. Proceeding thus, it was found that Laura was able to distinguish two points at a distance of 0.502mm. on the point of the tongue—an average of twenty-four observations; at a distance of 0.708mm. on the volar side of the end of the right fore-finger—an average of thirty-seven observations; at a distance of 1.2mm. on the inside of the red edge of the lips—an average of eight observations; at a distance of 1.6mm. on the outside of the lips—same number of observations; at a distance of 1.51mm. on the end of the second finger—eight observations; 1.8mm. at the end of the third finger—eight observations; 1.9mm. at the end of the fourth finger. On the upper lip just above the end of the mouth she distinguishes an interval of 3.5mm., at the back of the tongue 4mm., on the forehead between the eyebrows transversely 6.71mm., on the tip of the nose 1.7mm., on the point of the cheek bone 3.04mm., each of the last five measurements being averages of twelve observations made on three different days.

By comparing these results with Weber's tables, it will be seen that tactile sensibility in most of the places measured is from two to three times as great as that of an ordinary person. In making the above observations, however, it must be noted that a strange variation of sensibility was observed, which was so great as to make the preliminary results here given reliable only in proportion to the number of single measurements from which they were averaged. Sometimes, with the utmost apparent straining of attention, the discriminations were less than half as acute as at others. So great is this variability that it is hoped that a curve of fatigue may be obtained by which some approximate comparison with the fatigue-curve of a nerve-muscle preparation may be made. We may already infer however that the exceptional acuteness of this sense, in Laura, is centrally and not peripherally conditioned. It is probably due to the unusual energy with which she has learned to concentrate attention upon the sensations of fingers, tongue, &c. It was often observed that the *Empfindungs-Kreise* were ellipsoidal and not round, the longer axes coinciding with that of the body or limb;¹ and that, when one point of the compasses was rotated

¹ Czermak's explanation of this general fact, *viz.*, that these sensory domains are round in children and become oval because growth is propor-

about the other, at a distance of only one-sixth that of a diameter of the *Empfindungs-Kreis* within which they were placed, the sensation of motion was distinctly felt. The habitual exploring touch-motions (*prüfende Tastbewegungen*) which, as with most of the blind, are almost irrepressible with her during such experiments, has perhaps made her more sensitive also in this respect than others, although this point has never been investigated. It was very evident, before the writer's observations were interrupted, that there were strange and sometimes abrupt variations from the tactile sensibility of a normal person in certain accessible parts of the skin which were neither scarred, nor ever in any way, so far as could be learned, injured or diseased. These spots are so obtuse in the discrimination of local signs and local colour as to suggest the question whether certain slight twitches often observed in various muscular groups, which according to the radical nomenclature of Hughlings Jackson must be called epileptical, together with certain other almost equally mild hysterical symptoms, may not have had the result which is so common in severe forms of these disorders, *viz.*, partial and more or less distinctly defined dermal anæsthesia. Laura has in the hands and face a sensitiveness to ordinarily imperceptible and sometimes imaginary dust which very closely resembles, save in degree, that described by Charcot and Westphal as one of the characteristic symptoms of incipient mania. Her touch is thus so acute that it is not surprising that she estimates the age of her visitors by feeling the wrinkles about the eyes, and tells the frame of mind of her friends by touching their faces, nearly as accurately as a seeing person could do. From the tonicity of the muscles or the movements of the hand she conjectures the grade of intelligence of her visitors, and long ago learned to detect almost instantly the hand of an idiot by its peculiar flabbiness. She tells readily the time of day by feeling her watch, remembers the hands of her friends for years. A few of the figures of Zoellner and Hering were found to be as deceptive to the touch of the blind when pricked on paper as to vision. It has been said, on the authority of Professor Abbott in *Sight and Touch*, that if a flat surface be pressed with the fingers first gently, then hard, then gently, and again hard, gently, hard, it will seem in the one case convex and in the other

tionately greater in length than in circumference, seems partial. Most of our motions both of the body and limbs are in a horizontal plane, *i.e.*, at right angles to the long axis of these domains; hence that direction grows more sensitive. Moreover, as Horwicz well remarks in commenting on the proven inaccuracy of Vierordt's law, frequency of use is a co-factor with mobility and original nervous structure in determining the sensitiveness of different parts of the body.

concave: this after many attempts the writer was unable to verify with Laura or in a single case with a score or two of the blind.

Her sensitiveness to heat is below the average. She certainly could never distinguish colours by difference in their powers of radiating heat. It has been observed that when seeing people are blindfolded they are able to tell which of five or six familiar and previously named objects is held before the face at a distance of from one to three or four feet. A book, a folded handkerchief, a scrap of sheet-iron and a piece of gauze, *e.g.*, all of about the same surface-measurement, are distinguished in this way, as well as the side of the face towards which they are held, by a friend of the writer almost invariably at a distance of four feet in a darkened room, and with every precaution to avoid giving any clue to the eye or ear. Is this due to the modification of half imperceptible sound-waves affecting the tympanum or to changes of thermal radiation from the skin or to modification of atmospheric pressure? Laura has very little of this power, but observations on the deaf have shown that some of them possess it to a great degree. Moreover it should not be forgotten that the ear is a bad judge of direction; hence we must assume that other elements enter in as the data of sensuous judgment in this phenomenon. Only a cursory examination of the dermal sensibility to temperature, pressure and electrical stimulation was made, but this indicated in each of these respects, and especially the last, a degree of sensibility below rather than above the normal. Finally, it may be mentioned that, from a short series of measurements which a lady-attendant kindly consented to take upon parts of the body usually covered by clothing, it would seem that here the discriminating sensibility, though decidedly above the average, is much less so than in the more sensitive parts of the hands and face. In applying the compasses to one arm a concomitant increase of sensitiveness was observed on the corresponding part of the other.

To test the sense of equilibrium, an ordinary swing with a long board, pillowed and provided with a foot-piece, was used, on which she consented to be rotated, lying upon her back, her face and both sides. In each of these positions, after being turned through 180° and then gently placed upon her feet, there was a very evident disturbance of muscular coordination, and she insisted that she was very dizzy. On rotating her through 270° , she was hardly able to stand without support and complained of nausea, describing herself very vividly by gestures and language as seeming to "turn over" in the same plane in which she had been rotated, but in an opposite direction: of the genuineness of these sensations, her ignorance of

the object of the experiments and of the normal muscular movements of compensation leaves no reasonable doubt. The dizziness, it was further observed, must be considerable before the power of correct orientation was lost. She was able to tell more correctly than several normal persons who afterwards tried the experiment upon themselves blindfolded, whether she had been turned through half or three quarters of a circle. She was equally sensitive to rotation in a horizontal plane. By so *ex tempore* a method it is of course impossible to exclude, as Mach has at least partially done, the influence of tactile sensations caused by friction, and the process of standing her suddenly upon her feet after every rotation complicates the disturbance: but it is impossible to doubt that she is so extremely sensitive to disturbance of equilibrium, in which both the deaf and the blind are often deficient, as to compel the belief that, upon the hypothesis of Goltz and Mach, her labyrinthine impressions are at least normally acute, and to make a *post mortem* examination of the semi-circular canals with their nerve and its putative centres extremely desirable. She does not appear to be in the least ataxic, but it will be remarkable if touch and muscle-sense have, in addition to all their other vicarious functions, so well learned to discharge those now generally supposed to be due to endolymphic pressure. She can walk alone very nearly in a straight line, and without deviating more often to one side than the other, though always with a hesitating but not unsteady step; she takes long daily walks with her attendant, looks after her own room, goes freely all over a large house, and in any place with which she is familiar knows the points of the compass.

The more strictly organic sensations are not accessible to exact measurement. Even the muscle-sense or feeling of innervation, which even in the case of a normal person and still more in her is so largely instrumental in the work of objective perception and which seems to be so exquisitely delicate in her hands, cannot be directly tested. When told to extend the fore finger and move it as slightly as possible, she makes motions which the eye can but just detect. When the arm or hand is taken and moved through a fixed distance, as an inch or a foot, and she is requested to measure off the distance on a smooth glass rod, she does so with considerable accuracy, although this, like all her similarly indicated estimates of distance, are slightly less than fact. When the compasses are applied to hand, arm, or shoulder-blade, with their points separated in each case about three-times the least discernible distance, and she tries to reproduce these intervals in terms of muscle-sense by measurement on the glass rod, it is found that she invariably judges

the greater distances to be proportionally less than the smaller. We cannot infer from this that her notion of the form of her own body is different from the reality on account of the variable discriminative sensibility of the skin. There are very many ways in which this tendency would be corrected in the blind. Yet when asked to make a series of straight marks, *e.g.*, two inches long and two inches apart, the first pair with the hand in the ordinary manner of writing, the next in a constrained position writing on pasteboard pressed against her back and so on alternately,—the marks made in the latter position were found, in an average of over thirty cases, slightly shorter and slightly nearer together. It would be very interesting to compare these results with those obtained with a large number of normal persons. Like many women of somewhat delicate health, she appears very susceptible to other organic sensations, and though subtle inferences might be drawn about semi- or sub-conscious states and processes from her moods which vary considerably, she seems never to have developed, as a late writer asserts is almost inevitable among those whose sphere of objective mental life is abnormally circumscribed, any "liver-consciousness," or "heart-consciousness," or "stomach-consciousness". She has never, so far as is known, shown any special trace of hypochondria or hysteria, or even melancholia, and in everything sexual her education has been so discreet, that the innocence and purity of her thought and life are said by those who know her best to be absolute and even unique. One of the most common notions developed among the blind when they are left much to associate with each other is that they have one real advantage over the seeing in that they are free from all species of optical illusion, and thus, although they know less, their knowledge is more untheoretical and realistic. In this way Laura's is in a double sense realistic and objective. All her knowledge is literally *handgreiflich*. Touch seldom deceives or misinforms and its *rappont* with things is most immediate; hence she clings to all its impressions, even when told they are wrong, with great pertinacity.

The physiological theory of language regards it as originally an immediate motor reflex of sensations perhaps mainly visual, and as being thus a more or less complex series of gestures which soon come to acquire a special auditory significance as a condition of a remarkable subsequent development. Regarding words as gestures, it would once have been comparatively easy to teach Laura by such manipulation of the organs of speech as Graham Bell has applied in teaching the deaf to talk. By this method, with the use of a manipulator, the writer taught her in half an hour to articulate the words "good day" intelligibly, but the next day they were quite forgotten. She is now too

old and too adept with the finger-language to make a new method of speech possible. She learned long ago, by feeling the throat and mouth of others and by their help, to pronounce three or four words quite well, and has never forgotten how to say "doctor," "Peter," "money". She has also half a score of "noises," designating persons. These seem to be produced by translating the complex of impressions, or more strictly sensations, which others excite in her into the movement-feeling of 'throat-gestures,' and thus they are very analogous to cases of so called 'indirect onomatopoeies'. Still more interesting however are the instructive and utterly unconscious sounds, which Dr. Lieber took so much pains to investigate, that do not designate objects but express her own feelings. These to the number of nearly thirty the writer attempted, with the kind assistance of Miss Fuller, principal of the Horace Mann school of deaf mutes in Boston, to record by the Bell method of visible speech. They are always accompanied with marked facial and often manual gestures. She thus often expresses feelings which she wishes to conceal, as well as shades of feeling too slight and subtle for the fingers. On being questioned she insisted that she could "*think*" three noises—even a very loud and disagreeable howl of anger which she has been heard to utter but two or three times in her life—without making them, but she could not make them without the feeling. By special request she tried several times with great complacency to make the "angry noise," but in vain. She once said, "When I think of Julia I think her noise and do not think to spell her name". Several of the emotional sounds were made during a dream, the pantomime of which was very expressive as she took her after-dinner nap upon the sofa. She is very positive that her nightly devotions are without vocal or manual signs. The devotions are very regularly performed and the signs, so far as could be learned, have never been observed. These interjectional sounds which her teachers have often striven, but only with partial success, to repress, are not loud or disagreeable, are readily intelligible, and, so far as the data for comparison exists, seem neither to have essentially changed in character or in pantomimic accompaniment, nor to have increased in number for many years. She feels that it is "not lady-like" to make them, and is glad to be corrected, but unless they are quite loud, cannot tell, even if her attention is directed to the matter, whether she really makes a noise, without placing her hand upon her throat. Pressing thus on the throat of several persons successively, she sometimes sportively attempts to imitate their voice with her own in a way which shows that she does distinguish differences of both loudness and pitch (paradoxical as the language may be) without any

conception or sensation whatever of sound. That her emotional "noises" have any such philological importance as roots as Dr. Lieber and others have imagined, seems on the whole very doubtful. Aphasic patients sometimes use a set of new and strange sounds as designations of objects or as expressions of passion consistently and without change for years. True, her sounds have not been modified, as are the natural cries of those congenitally deaf but not blind, by imitating the motions of lips and tongue which they see others use: but the fact that she has once spoken is very viciating for such a view. Could however any inference whatever bearing upon this perhaps the most important and most difficult of all psychological questions, be drawn from such facts as the above, it would be that language originated not in the imitation of natural sound nor in the impulse to communicate with others but as a purely physiological reflex excited by the stimulus of outward impressions acting upon or through the senses.

She is not apt, like many defectives, to fall asleep if left alone or unemployed. Her sleep is perhaps lighter and shorter than the average. Several midday naps were observed. She first groped about the room to assure herself that she was alone, then lay down, her face upward and the right or talking hand folded in the other upon her breast. There was at first a slight and regular movement of the chin and toes, while the faint prolonged sound of 'oo' (as in 'fool') often accompanied expiration; slight epileptic twitches several times roused her to quite a pantomime of rapid, troubled and mostly unintelligible gestures; till at length she fell asleep with long, regular breathing, the teeth slightly apart, and the tongue pressed against and almost between them. Just before sleeping, a strong odour of eau-de-cologne and a drop of sugar solution, which she readily perceives when awake, applied respectively to nose and tongue, caused no apparent sensation, while the slight touch of a fine thread upon her face or hand roused her at once. It is possible she directs her attention to the cutaneous sense of these parts, as we often 'set the mind' to wake at a certain strike of the clock; or perhaps this sense is the last to fall asleep. Her sleep seemed almost never untroubled by dreams. Often she would suddenly talk a few words or letters with her fingers, too rapidly to be intelligible, just as others often utter incoherent words or inarticulate sounds. Movements of the lips were also observed, and the emotional expression of her face was constantly varied. She asserts that she dreams much, but finds it very hard to recall her dreams; insists that she has dreamed of hearing with her ears the angels playing in heaven, of seeing the sun so bright that her eyes ached, and of standing in

a large place surrounded by many people and seeing God afar off. In relating these dreams her manner is very earnest and intense, but if questioned how the music sounded, how the objects looked, she could give you no more detailed answer than "glorious," "beautiful," &c., and often became quite impatient at the scepticism implied in questioning her closely. She has many times dreamed of being awakened suddenly by animals touching her, or jumping upon her bed. If a normal person dreams in terms of touch, this sense is generally excited only at the end of a series. The dream begins in terms of sight or hearing, and rarely goes so far as contact. The suddenness of so many of Laura's dreams which begin and end in the domain of touch, thus indicates that her dreams are only in its language.

Most dreams are reflex phenomena due to the irritation of sensory nerves. Any or all of the five senses may be excited during the soundest sleep. If attention is directed to the darkest field of vision we can always see the light-chaos or dust (*Eigenlicht*), or perceive a difference of intensity between the centre and periphery of the field. It would almost seem that modifications of retinal circulation, nutrition, temperature, &c., have a psychical side accessible to self-observation. Goethe could always see streaks of mist; Purkinje saw broad, bending bands, sometimes moving in concentric circles or breaking up into arcs and radii. To J. Müller, these moving spots of mist seemed coloured, they moved about from side to side of the field of vision, gradually took shapes quite disconnected from any objects of recent experience and finally passed into dream-images. Thus, from the nature of the light-chaos, we may account for the reduplication of dream-objects—swarms of birds, flies, stars, kaleidoscopic patterns, &c. H. Meyer and Patterson, on waking suddenly, have seen the after-images of dream-objects slowly fade through complementary colours. We may infer from such facts how strongly the higher centres sometimes react in dreams upon relatively slight stimuli of the lower. Hermann further concluded that those who were blinded by lesions of the peripheral organ gradually lost all distinct visual conception, first from the waking and later from the sleeping consciousness. Laura never has been and can probably never be taught to observe and note down her dreams with any such precautions as Wundt suggests; but a careful analysis of all dreams which she now remembers, or which others have recorded, yields no good ground for believing that she has ever had any kind of visual or auditory conceptions even while sleeping, when the immediate sensation is a still more minute, though perhaps no less indispensable, element of perception than in the waking state. Even her sexual dreams, there is every

reason to believe after the most careful inquiry, have always been very few in number, and of so naïve and unspecific a character that only a psychologist would designate them by that name. Now that she has safely passed the most trying period of womanhood without more instruction on such subjects than was strictly necessary for her health, it seems on the whole not improbable that the strongest of all instincts has in her failed to mature, either in the waking or sleeping consciousness, into any distinct *à priori* notion of the ways and means of its own gratification.

Schermer has propounded the curious and improbable theory that dreams are symbolic of the constitution and functions of different parts of the body. All dreams, he asserts, are reflexes of organic feelings, and their types and genera are determined by the forms and positions of the organs. The intestines, *e.g.*, appear in dreams, "after the ego-power is scattered and dispersed," as streets and canals, the stomach as an enclosed or sequestered village or as a dark room with one or two round windows. The body as a whole is always a building of some sort. He dreamed of two rows of boys in red and white, rushing to fight each other, retreating and fighting again round after round. These are explained as the teeth, the involuntary grinding of which is supposed to have caused the dream. The lungs are objectified as a pair of regularly beating wings in dreams of flying, the heart is a fiery furnace, a stove, the sun, &c. Even colours as of the hair, the blood and bile, are reproduced. Not one of Laura's dreams can be satisfactorily interpreted by any of these rubrics. This test of Schermer's theory is of course not crucial, but if internal organs are ever represented in the consciousness of sleep, and especially if they are archetypal there, we should expect this to be peculiarly so in Laura's case: so that to all the psychological objections to such a theory her dreams add in some degree the force of an experimental refutation.

Wundt holds that all dreams, hallucinations, nocturnal insanities, &c., are automatic excitations of what he assumes as a *sense-surface* in the cortex caused by modifications of its circulation, and that they are thus reflexes, originating in the innervation-centre of the blood-vessels in the medulla. This may be true of many toxics and soporifics, and disorders of the blood-vessels and heart very often accompany or precede mental disease. It is an assured law of psychiatry that every functional or mental disturbance brings about anatomical changes in the brain, and thus dreams may even permanently affect the sanity of waking-hours. Hence, if we admit, upon the uncertain hypothesis of Hughlings Jackson, that the development or nutrition of cortical cells is determined and limited by the

course of blood-vessels in the cortex, we should expect that the cells lying nearest them, and which we may fancy to represent the earlier acquisitions, are more immediately affected than those distant three or four removes and representing later acquirements and experiences. If this were true, we ought, according to Wundt, to dream mainly of the experience of childhood, and not of the preceding day, and it would be at least possible that forgotten events of early infancy should be reproduced. Dreaming and waking notions are related as species and genera, or as a more partial to a more perfect function. Attention, to the physiologist, is essentially the expression of an instinct. The mind pushes on from one impression to another by a native spontaneous impulse of growth and development. If we may conceive every thing psychical expressed in terms of inner tension, we may say that the direction and movement of attention is like the successive waking of the different elements of psychical life. In the sleeping consciousness, this process is mainly an automatic and central one. 'Inner work' has brought cells into unstable equilibrium, and excitability very easily becomes excitation. Where the work of repair is not done, the slight stimuli of the sleeping state is not sufficient to rouse them: where it is done, the almost spontaneous activity of rested cells easily raises their processes above the threshold of consciousness. These are of course fresh and healthy morning dreams, while only those cells which had suffered the greatest fatigue, or which, long after the outer senses slept, had been morbidly prevented from restfully sinking below the threshold to the inner work of repair by the persistence of mental after-images of recent events, may be said still to wake. Now in the waking state the activity of the senses brings to bear an environment with which the normal action of the centres, if acting only by their own law of rest and fatigue, is more, or less inconsonant. Not only can attention not always be accommodated to its object beforehand, but certain centres are disproportionately exercised. In sleep all the centres have a greater degree of physiological freedom. Possibly Laura vaguely strove to express this distinction in a line of one of her so-called "poems," viz.:—"A good sleep is a white curtain, a bad sleep is a black curtain". All the intellectual work she has ever known has been scarcely more than the exercise of what Mr. Spencer calls the *play-instinct*. What she has done has been spontaneous. The sudden arrest of peripheral activities of the higher senses, leaving their centres under conditions which perhaps kept them exceptionally unatrophied, may have raised the level of cell-equilibrium, so that she both wakes and sleeps on a higher plane of cerebral rest and nutrition. This at any rate is not inaccordant

with the remark of the physiologist Burdach, who, in comparing the accounts of ten blind and deaf mutes, argued that Laura's remarkable understanding was due to "the creative elaboration of impressions unprecedentedly limited in variety".

To distinguish what was native from what was adventitious in Laura's moral, and especially in her religious, development was one of Dr. Howe's chief interests. He had no Rousseau-like expectation that perfect goodness would result from her unprecedented isolation; still less had he any wish, as was sometimes fanatically urged against his method, to retard the unfolding of her mind in either of those directions. He only required her teachers to refer Laura to him for answers to her occasional questions upon these subjects, and sought in every way to shield her from dogmatic indoctrination. The early record of her fresh and original intuitions, of her curious approaches to questions regarding the nature and necessity of a First Cause, of the unaccountable development of her conscience, all so essentially correct yet so unconventional, excited great interest at a time and among people where the central question of theology and philosophy was to determine what factors of consciousness were due to experience and what were *à priori* or intuitive. About 1845, soon after his return from some months' sojourn in Europe, Dr. Howe was quite disheartened to find the mind which he had laboured so long and devotedly to develop in the way which he believed to be at the same time best for it and most instructive to the world, cobwebbed with the barren formulæ and conventionalised by the shallow sentiments of one of the popular orthodoxies of the day. "I hardly recognised," he said, "the Laura I had known." We should not be greatly surprised if his interest in her became gradually less as she fell more under the influence of her new spiritual guides, and thus grew month by month less original and less interesting. Nothing can exceed the crudeness of the Bible translated into terms of her one sense of touch. "Is not the Lamb of God grown to a sheep yet?" "Will Jesus carry us in His arms so?" (with the gesture of a mother embracing her child). "Was not Thomas right wanting to feel the wounds of the spear?" These and many other similar questions are on record, attesting at the same time her native curiosity and the poverty of her conceptions. It would seem, as far as can be learned, that since the time of her conversion and admission with immersion into the Baptist Church her disposition has grown sweeter and her temper more uniform. But when one takes the trouble to enumerate the facts of the New Testament and the cardinal Christian doctrines with their standard forms of illustration, of which she can have even no childish conception, it is seen how minimal the intellectual element of faith may be;

while if, on the other hand, with Schleiermacher, we consider the essence of Christianity to be the formulation of the instinct of dependence so unprecedentedly strong both by nature and education in her, we shall possibly wonder less that so many of her friends have found edification in her numerous conversations and letters concerning her religious experience and belief.

The above is very far from exhausting even in epitome the interesting points suggested by the study of this remarkable case. Laura has very little idea of the interest she has excited in the world; is intensely delighted to see her friends, or to receive any little attention or remembrance from them; and is so good-hearted that the writer is pleased to state in closing that, in spite of the weeks of annoyance to which his experiments subjected her, she was always cheerfully ready at the appointed time, and still cherishes only the kindest sentiments towards her tormentor.

G. STANLEY HALL.

NOTE.—A question of great interest, suggested by the Editor with reference to a note in Whateley's *Logic*, is how far has Laura been able with the help of her means of expression to form concepts proper, and how far her thinking is able to proceed without the help of her manual marks and signs. Whateley's statement (foot-note to Introduction, § 5) that slight and unintelligible motion of the fingers can generally be observed when she is musing by herself, is not in accordance with the writer's observation. She often sits alone apparently absorbed in thought and reflecting her emotions in smiles, frowns, &c., and with no movement whatever of the hand, although the latter is sometimes observed. If we consider that all impressions above those of touch, which others apprehend in the form of sensuous images must be thought by her, if at all, as general conceptions, it seems probable that her thinking does range beyond the individual objects of her sense without finding signs necessary as instruments of thought. This conjecture is strengthened by the general intelligence which appears to have characterised her childhood before her education began.

G. S. H.

II.—HARMONY OF COLOURS.

IN an acute and interesting article "On Discord," published by Mr. Edmund Gurney in the last number of this Review, there are one or two very sensible remarks on the difficulty of reducing the effects of colours in combination to simple physiological and psychological laws. These difficulties, as Mr. Gurney observes, "are almost enough to make one despair of anything like an exact and complete *rationale* of colour-discords and affinities". Mr. Gurney is here only concerned with the obstacles in the way of interpreting the facts: he does not touch on a

more fundamental difficulty still, that of ascertaining the facts themselves. When this is taken into account as well, when the chaotic state of opinion as to what combinations of colour are harmonious or discordant is fully recognised, it seems as if we might safely dispense with the precaution which Mr. Gurney takes in introducing the little adverb "almost".

If, then, anything further is attempted by way of accounting for the agreeable and disagreeable effects of combined colours, it must be done in a very different spirit from that of most past theorists. It has commonly been assumed that there is a close parallel between colour and tone harmony. But while the physiology of the ear has supplied a firm basis for musical science, the physiology of the eye has so far done little to support any definite principles of colour-combination. As Helmholtz, the great authority in both branches of physiology, reminds us, "it would be absurd to attempt so sharp a definition in respect of the so-called harmony of colours as we are able to attain in dealing with musical intervals".¹ The object of the present paper will be mainly to emphasise this truth by examining into the facts at our disposal, and by criticising the leading theories put forward. At the same time an attempt will be made to indicate roughly how much physiology and psychology can do for our seemingly impenetrable subject.

To begin with the facts, a slight acquaintance with the arts of music and painting will show that in the latter there are no simple uniformities of combination answering to the fixed and definite relations holding between tones. In all known systems of music,² an octave or a fifth is recognised as consonant, a semi-tone or a major seventh as dissonant. But where are the chromatic intervals corresponding to these? Let the reader spend an hour in studying the illustrations of decorative colouring given by Mr. Owen Jones in his *Grammar of Ornament*, and he will be convinced of the truth of the observation. He will certainly be struck by the great diversity of taste shown by different peoples, both as to the relative value of single colours and as to the best order of arrangement. Thus, for example, the combination of blue and green, which is wholly eschewed in some styles, seems to be almost a favourite arrangement in Persian art (tile-patterns). A similar diversity of taste is discoverable among individual colourists. And if this want of agreement is conspicuous in art, it is still more prominent in common life. Witness the endless discussions which are carried

¹ *Physiologische Optik*, p. 270.

² Of course, I refer here only to the music of the West in which discrete tones are employed.

on among women as to what is correct in the way of colour-arrangements in dress and in furniture.

Where practice is so diversified we may expect rules to be conflicting, and this is what we find. Works of practical instruction in painting afford a curious illustration of this want of uniformity. For example, the juxtaposition of blue and green, which is often condemned by teachers of art, is called by Mr. Ruskin one of the loveliest combinations the eye ever meets with.¹ Again, red and green, though commonly allowed to be good, are called an inferior combination by Sir J. G. Wilkinson. Still more oddly, complementary colours, though often said to be the most pleasing combination, are excluded from all art by a German writer (Schiffermüller) as crude and boorish.

Is there, then, beneath all this diversity any real agreement, and if so, to what does this amount? In order to ascertain this, it is necessary to make a wide and careful survey of different branches of art, more especially the decorative arts (mural painting, ceramic colouring, glass-staining, &c.), which are not restricted like imitative painting by the facts of nature, nor controlled like dress by extra-æsthetic influences.

In making this examination it is to be borne in mind that the properly chromatic relations of colours can only be certainly ascertained when these are taken in fairly equal degrees of brightness. If one colour is much darker than the other the combination may please through the contrast of light and dark, even though the colours do not combine well. Again it is to be remembered that the presence of a third colour, including black and white, materially affects the apparent degree of affinity of two colours. Thus, for example, green and blue seem to be reconciled when opposed to a large mass of warm colour.²

Proceeding in this way, one will find that the amount of agreement actually demonstrable is exceedingly small. First of all it will be observed with reference to binary combinations that all the most distinctly marked colours, namely, red, yellow, green and blue, may occasionally be seen in juxtaposition, though certain combinations undoubtedly appear much more frequently than others (as, for instance, blue and red more often than blue and green). It is to be added that the combinations of colours which seem to be most popular include both wide and narrow

¹ It is only fair to add that Mr. Ruskin is here speaking of colours in nature where effects of lustre, &c., are apt slightly to disguise the relations of colour. But this does not detract from the value of the observation.

² It may be added that when a colour serves as a narrow border to a large area of some other colour the relations of the two cannot be so well ascertained as when both colours have a considerable area of their own.

intervals in the spectrum-circle.¹ On the other hand, certain combinations of intermediate hues as, for example, spectrum-red and purple-red, yellow and sap-green, appear never or only very rarely.

If, again, we inquire into the principles which regulate larger combinations of colours, as triads, &c., the utmost that is clearly ascertainable is that certain groupings present themselves much more frequently than others. Thus, for example, it seems tolerably certain that there is a general preference for the "primaries," according to painters, namely, red, yellow and blue, above *most* other triple combinations,² though it is not at all clear that they stand alone in this respect, since the combinations red, green and yellow, orange, green and violet, appear frequently enough to deserve the name of favourite triads.

Such are some of the principal agreements, or more correctly approximate agreements, which are discoverable by means of a careful inspection of art-usage. I purposely abstain from entering into the still more difficult question what changes with respect to colour-combination appear to attend the gradual development of the colour-arts. In order to get at uniformities, we must have no prejudice in favour of primitive or of advanced art. It might perhaps be thought that the simple facts of colour-sensibility would be best reached by confining ourselves to the lowest stages of art. But we must not assume that in early art there is a truer appreciation of chromatic harmony than in later art.³ In truth, if we must choose between simple and highly developed art, it would surely be more reasonable to argue that the feeling for colour-affinity being a finer sensibility than the feeling for mere colour and its varieties, would show itself most plainly in the higher stages of art-progress. But for our present purpose it will be best to treat the question of colour-harmony as far as possible apart from the development of art.

So much as to the facts, and now as to the methods of interpretation proposed. First a word may be said of the crude theory put forward by writers on colour that all combinations of colour should be based on the three so-called "primaries" (red,

¹ By the spectrum-circle is meant the circle that would be formed by uniting the extremities of the spectrum-scale, with the addition of the colour (purple) formed by combining the extreme rays.

² Instead of spectrum-red (vermilion), purple may be employed, as in several pictures by Paolo Veronese.

³ As is done by Mr. Owen Jones and Sir J. G. Wilkinson when they place early art above later because of its preference for "primaries" (red, yellow and blue) to secondaries and tertiaries. It does not even follow that early artists did prefer the primaries *as colours*, since they may have used them because as pigments they were the most manageable.

yellow and blue) as the normal or at least most natural arrangement. This theory is a hasty attempt to find a scientific foundation for artistic rules in physical facts. It fails because it assumes that the laws of the action of light on the retina can be gathered from the laws of combining pigments. All students of optics now know that, when we are speaking of coloured light, yellow is no primary at all,¹ and that the production of a green pigment by mixing blue and yellow pigments is not simply due to an addition of blue and yellow rays, but involves a diminution of these rays consequent on the combination of different processes of absorption. For the rest, as has been observed, the doctrine of the superior value of the primaries does not appear to be borne out by the facts.

A more genuinely scientific attempt to found a theory of colour-harmony on physical facts is made by those who follow Newton in dividing the colours of the spectrum after the manner of a musical octave according to the numerical ratios of their underlying vibrations. One of the most recent exponents of this musical theory of colour is Unger.² This writer seeks most elaborately to prove that the best chromatic intervals answer to the best tonic intervals; *e.g.*, red-blue or orange-violet answers to the fifth. He also attempts to construct major and minor colour-harmonies, and even a system of transient colour-discords. Unger's method is singularly ingenious, but far from convincing. The latest authorities in physical optics, as Helmholtz and Brücke, agree that the spectrum cannot without forcing the facts be resolved into an octave.³ For the rest Unger's illustrations of his theory from the history of art really prove nothing except that almost every conceivable combination of colours is to be met with in the works of the masters.

Even were there not these objections to the comparison of the spectrum with the musical scale for the purpose of discovering some definite laws of colour-concord, such a comparison would in the present state of our knowledge be useless. The discoveries of Helmholtz in physiological acoustics go to establish the conclusion that musical harmony does not directly depend on the numerical ratios of the vibrations of the notes combining, but on the absence of beats between these notes and between their several partial tones. Hence it is vain to make out that colours

¹ Professor Maxwell has fully exposed the pretensions of yellow to be considered a primary element of colour. See a paper "On the theory of Compound Colours," in *Philosophical Transactions*, 1860, pp. 77, 78.

² See the full statement of his theory in his work *Die bildende Kunst*.

³ See Helmholtz's able critique of Newton's theory in *Physiologische Optik*, pp. 236-7; also Brücke, *Die Physiologie der Farben*, Introduction, pp. 5 and 6.

which harmonise well stand in a simple ratio to one another in respect of their vibrations, unless it can be proved further that these ratios involve the absence of disturbing elements corresponding to the beats of discordant notes; and physical optics does not, I believe, suggest the presence of any such elements.

But if the physics of light and of sound fails to help us in drawing an analogy between the effects of colour and tone combinations, may we not call in the aid of the physiology of the two organs concerned? With respect to the eye, recent research has taught us a good deal concerning the nervous conditions of colour-impression. We may provisionally adopt the hypothesis of Young and Helmholtz that all our impressions of colour are built up out of three elementary sensations (red, green and blue or violet) which correspond to the excitations of three specifically different classes of nerve-fibres. We may further suppose that these three classes of fibres are equally distributed over the retina.¹ Once more we may assume that the effects of colour-combination are capable of being produced by the stimulation of different areas of the retina. That is to say, the eye must be supposed to appreciate two colours in juxtaposition to some extent at least without moving from one to the other, and by simply fixating the common boundary of the two colours. This assumption, which seems to be required by the facts, does not, however, preclude the supposition that the pleasing or disagreeable relation of two colours is much more vividly felt when the eye fixates each colour in succession, or in other words when each colour successively stimulates the region of the yellow spot.²

Let us now see whether these considerations enable us to trace an analogy between the effects of colour and tone concord. It may be said that Helmholtz's doctrine of musical harmony refers this phenomenon to a positive as well as a negative condition, namely, the presence of certain common elements (the upper or partial tones) in the combining tones. Similarly, if we adopt Young and Helmholtz's hypothesis, it follows that in the case of colours lying near one another in the spectrum-circle,

¹ This is not exactly true as the observations of Purkinje and others shew.

² Since the comparison of two colours with a view to appreciating their affinity by the eye at rest is only exact in the case of contiguous colours, and becomes very imperfect when there is any considerable space between the colours, we might perhaps hypothetically assume that there is a sympathetic relation between the nervous elements of contiguous regions of the retina, owing to which the excitation of one central region affects in a much lesser degree the closely adjacent regions and in the same manner.

there is a distinct common element, namely, the sensation answering to the fibres excited in each of these cases. If then we say that all colour-concord holds between adjacent colours, and conversely, that all adjacent colours harmonise, we seem to have a theory of colour-concord analogous to that of tone-concord.

Such a theory, however, would first of all be clearly opposed to the facts, since as we have seen, many harmonious intervals are wide ones, while on the other hand some adjacent colours are distinctly unpopular combinations. But even if the theory tallied with the facts it would not bear close inspection. Helmholtz's theory of three classes of optic fibres teaches that each of these is stimulated to some extent by all ordinary impressions of colour, so that, according to the supposition we are now considering, the specific feeling of harmony ought to be an accompaniment of every possible combination of colours. This is surely a sufficient *reductio ad absurdum* of the hypothesis.

But besides all this, it is plain that the nervous and mental processes involved in perceiving a combination of tones and of colours are too unlike to allow of our drawing any close analogy between their accompanying feelings. Two complete musical tones or clangs never fuse into one indivisible tone, and the feeling of harmony arises just because these constituents, though appearing in some strange way to join in one mass of sensation, do not (as in the case of the partial tones of a single note) wholly sink their individual existence. But two impressions of colour, if they fall simultaneously on the same part of the retina, blend inseparably in one apparently simple sensation.¹ Thus yellow is supposed to be the sensation produced by stimulating the two sets of fibres corresponding to green and to red on the same retinal area. On the other hand, the so-called effect of colour-harmony is produced when the two impressions fall on different retinal areas and, unlike two tones of a musical chord, remain sharply separated from one another.

There is, indeed, one class of these effects of combined colours which may be said to bear a close resemblance to musical harmonies. I refer to the case in which colours are presented in such small masses that they partially lose their individual character and blend in a compound colour. An illustration of this effect may be found by looking over the column of warm light cast by a setting sun on the gently undulating surface of a summer sea. The alternate strips which reflect the rosy light

¹ This coalescence has been asserted by Dove and others to take place even between the impressions of "corresponding" areas of the two retinas. See Helmholtz, *Physiologische Optik* pp. 776, *et seq.*

and which are shaded by the soft undulations of the surface appear to blend, especially if the eye is partially closed, and the effect, on the present writer's feeling at least, is closely akin to that of a musical accord. Another familiar example of this phenomenon may be met with in certain wall-papers, where the colour of the small patches of the pattern runs, so to speak, over the colour of the ground.¹ Persian shawls owe some of their agreeable character to this circumstance of partial blending. This effect is plainly due to a compounding of the impressions produced by the two contiguous colours, whether these impressions are supposed to fall on contiguous areas of the retina, or on the same area (the yellow spot) as the eye involuntarily passes from one to the other.² It is plain that the two colours which are in this way to blend in part must not be complementary colours, since in this case the composition of the two impressions would result in white and not in a third "colour" in the narrow sense of the word.³

There is little doubt in my mind that this effect of partial coalescence of colour-impressions enters into the effects of art much more than is generally supposed. The peculiar charm of graduated tint may in part be due to this tendency to fuse small contiguous masses of colour, for it is hardly possible in looking at the colours of the spectrum to help imagining that the related tints do actually commingle.⁴ Painters are very fond of judging of the effects of colour in combination by half closing the eye and so obliterating the sharp demarcations of the contiguous tints. It seems likely then that some of the most delicious effects of colour in combination, as for example those of the finely modulated pictures of Mr. Burne Jones, involve this partial blending of individual tints.

Yet while attaching much weight to this greatly overlooked effect, I cannot claim for it the rank of the central and essential

¹ I lately bought a bed-room paper having a small scarlet pattern on a light buff ground. When looked at closely in a small piece in the decorator's shop the colours remained distinct, but when the paper was put up they seemed to blend as an orange tint which was much too fiery-looking for a room with a south aspect.

² If the latter it must be that the first impression remains as a positive after-image or ocular spectrum during the excitation of the second sensation.

³ I find that for some reason reds suffuse themselves in this way over other colours, as blues, greys, &c., with special readiness. This may be due to the greater energy of the impression in the case of the red rays, and the consequent greater persistence of the after-image.

⁴ According to this supposition any given tint may be viewed as the impression resulting from the harmonious combination of the adjacent tints on both sides.

fact in colour-combination. After all, in most cases, colours are to be seen as perfectly detached from one another. And since combinations of colours, when so detached, are sometimes called harmonious, it follows that such blending does not adequately account for the effects of colour-concord.

So much for the theory that chromatic harmony rests on a similar basis to that of musical harmony. Let us now glance at the second order of attempts to place the theory of chromatic combination on a physiological basis, namely those which set out from the phenomena of complementary colours. The disposition of the retina, after any impression of colour, to see its complementary hue as observed in the phenomena of complementary images, and in the mutual influences of contrasted colours in juxtaposition near their common boundary, was made use of by Goethe in his celebrated doctrine of colour (*Farbenlehre*) in accounting for the æsthetic value of combinations of colour. He expressed the fact by saying that "every single colour excites by a specific sensation the tendency to universality," whence the peculiar value of complementary colours, and of the whole scale of colours as seen in the spectrum. Much the same idea is worked out by Schopenhauer in his curious essay on Colours (*Ueber die Farben*). This writer looks on colours as the result of a qualitative partition of the activity of the retina, and regards the addition of the complementary hue to a given colour as the perfection of this activity. The fact that colours in juxtaposition tend under certain circumstances to influence one another so as to assume the appearance of complementary hues, was taken by Chevreul as the key to the true laws of chromatic harmony. Chevreul appears to have exaggerated the importance of the facts relating to the mutual modification of colours in juxtaposition. Such influences are very limited, and it is quite conjectural to suppose that contiguous colours *always* produce an appreciable modification of hue, through a calling-up of a negative image or contrast. Indeed this idea seems to be clearly contradicted by the simple fact that blue and red have their peculiar force of colour augmented by juxtaposition, whereas, if negative images were formed, the blue would lose its blueness and look greenish, and similarly the red would suffer and approach yellow. His harmony is, in fact, as he himself explicitly states, the combination of contrasts. Once more, Zimmermann in his *Allgemeine Ästhetik* regards the complementary image as a necessary concomitant of a colour and even as an essential element of the impression, and by help of this assumption seeks to institute an analogy between the effect of two complementary colours, of which each is thus in a sense contained in the other, and that of two musical tones, say those of an octave of which

the higher is already present in the lower.¹ This same idea of a complementary activity of the retina is made the basis of a theory of colour-harmony by E. Hering. It is also regarded as the fundamental fact by Mr. Grant Allen in his *Physiological Aesthetics*.

That complementary colours have a special æsthetic value seems indisputable in spite of the attempts of some to disparage these combinations.² Since on Young's hypothesis a complementary colour is one which brings into action that order or those orders of nervous fibre which the original colour leaves comparatively quiescent, it is certain, as will be seen by-and-by, that the juxtaposition of the two, whether they fall on the same retinal area in succession, or simultaneously on contiguous regions sympathetically related, must have a certain fresh and stimulating as well as a full and satisfying character for the eye. This latter effect, it is obvious, should be obtained just as well by a further subdivision of the colours, for example, of blue and orange into blue, green and red, (the red being made much more powerful than the green).

There is, however, great indefiniteness in this notion of complete retinal activity. At first sight it would appear, when translated into terms of Young's hypothesis, to involve an equal excitation of all classes of fibres diffused over the retina. But this is obviously impossible except by means of a very large white surface. It would be absurd to contend that two considerable areas of colour in juxtaposition are each perceived in succession by the whole of the retinal surface. Further, it cannot, as we have before remarked, be argued that two contiguous hues are always perceived by the same part of the retinal surface, and hence the fact that two considerable patches of colour in juxtaposition are pleasing even when the eye is most at rest, seems to show that a heterogeneous and partial qualitative activity of *different* regions of the retina has this satisfying character just as much as the complete activity of any given area.

There is another objection to the erection of the complementary relation into a precise scientific principle of chromatic combination. Two complementary coloured lights are such as being combined produce the sensation of whiteness. But in

¹ It is not of course accurate to speak of the complementary image being "contained in" an impression of colour. Strictly speaking it is the result of a second stimulation, objective or subjective, acting on relatively vigorous and consequently highly susceptible elements.

² Brücke describes a method by which he secured a series of impressions of perfectly complementary hues, and tells us that in every case the combination was pleasing (*Die Physiologie der Farben*, pp. 35, ff.; cf. pp. 204, 205).

order that they may produce this effect their *quantities* must have a certain proportion. If the one is much more powerful than the other, the result of combining them is not white but a whitish variety of the colour in excess. Now complementary colours in art are supposed by the advocates of this principle to be harmonious in an endless variety of proportion, whether the quantity of each light be measured by the area reflecting it or by its brightness. This shows that the eye is not, as some interpreters of complementary hues appear to teach, always seeking to realise a sort of unconscious perception of whiteness. The idea that complementary colours are synonymous with harmonious colours, evidently implies that colours lying near one another in the spectrum-circle are always discordant. This is not correct, since, as we have seen, closely related tints frequently combine with great effect. On the other hand, it is undoubtedly true that the most plainly and incontestably discordant effects of colour take place when the combining colours are thus related. So far as I can make out, the only instance of what is generally felt to be real chromatic dissonance is where one colour is visibly injured or impoverished by another, and this only happens when the colours lie near one another in the spectrum-circle. In dealing with this class of cases we shall, I think, exhaust all the truth that resides in the complementary theory, and at the same time dispose of all the points of resemblance between colour and tone harmony.

It is important to state that the effects now considered arise when the colours are produced by reflecting surfaces and not by the direct rays of the sun. There is good reason to suppose that the spectrum-rays, however combined, would not give rise to this unpleasant effect. It occurs frequently in juxtapositions of coloured fabrics, as for example, a scarlet shawl worn on a purple dress, or a blue shawl on a violet dress. It may be easily produced by combining tinted papers such as are used by book-binders. Thus a strip of chocolate brown paper if placed beside a bright pink strip seems to lose all its colour. In this way certain scarlets are apt to look bricky if placed by rose-red, and some yellows lose their force by the side of warmer tints.¹

It is possible that these effects are to be accounted for on the same principle as the mutually reinforcing influence of complementary colours, namely the exhausting effect of light-stimulation. The colour which is injured or "killed" commonly contains some element conspicuous in the other though in a much feebler

¹ So far as I can ascertain, one of the two colours always suffers more than the other, though in some cases there seems to be a mutually destructive effect.

degree. The eye feels this element to be taken out of the second colour and is consequently dissatisfied. What remains is either a faint and unsatisfying element of another colour (as when a gamboge yellow looks pale and greenish against a warmer colour), or an approximation to a dingy colourless grey (as when chocolate brown is killed by pink).

Again the fact that this effect of impoverishment seems to be confined to the colours of surfaces suggests the reflection that it is frequently due to the impurity of the colour which suffers, that is to say, to an admixture of other elements (faint white light in the form of grey, &c.). It is certain at least that the poorer and the less pure a colour when viewed apart, the more easily will it be killed when placed beside a rich and purer colour.

Now after we have frequently experienced this injurious effect we regard any new juxtaposition of colours in order to see whether they detract from one another's peculiar excellence; and when they do not, we are disposed to call them harmonious. This idea is certainly one, and perhaps the commonest, meaning of the phrase "harmony of colours".

Yet this fact of not injuring one another's characteristic quality does not exhaust the meaning of the term colour-harmony. In truth it looks as if writers on colour had been led astray by the associations of the word harmony. They have assumed that colour-harmony like tone-harmony must repose on some specific sensation. But the word harmony in many other connexions evidently means much the same as affinity, resemblance, or unity.¹ When for example we speak of an action harmonising with our idea of a person's character, we mean simply that it resembles in its nature and motives previously observed moral qualities. Now in the same way it may be said that much of what is meant by harmony in colour is some aspect of likeness consciously felt. In other words, the beauty of colours in combination may rest to a large extent on a conscious process of comparison, and involve a distinct perception of relation. In this sense harmony is the opposite of contrast, and can only be studied in connexion with this. I purpose devoting the rest of this paper to a brief consideration of the several ways in which the complementary æsthetic principles of harmony and contrast manifest themselves in the pleasing effects of colour in combination.

¹ Strictly speaking, the word harmony points rather to a subjective emotion, to the peaceful feeling of satisfaction which results from the perception of a certain objective correspondence, unity, or resemblance. I conceive that the words harmony and unity or uniformity in diversity, when employed in art, express but two aspects of the same fact, namely, an emotional and an intellectual aspect.

First of all, then, it will be well to enumerate the several distinguishable qualities or aspects of colour which serve as the terms of the relations of contrast and similarity. Some of these are fixed characteristics for each of the individual colours, others vary in the case of each colour.

Of the fixed aspects the most obvious is the chromatic quality itself. In order to estimate the affinities of colours viewed as impressions consciously compared, it seems necessary to set out with four fundamentally distinct colours, namely, red, yellow, green, and blue.¹ No one of these is felt as related to the others by resemblance, while all intermediate colours, as orange or blue-green, are immediately perceived to be transitions from some of these seemingly elementary impressions to others. The affinity between one of these intermediate tints and either of the adjacent elements, may be called of the first degree. On the other hand, the relation holding between any two elementary colours lying next one another in the spectrum-circle may be styled the second degree of affinity. This second degree does not involve similarity like the first, but simply expresses the fact that we may pass from one to the other by insensible intervals without introducing a third element.

Not only have the several colours their specific colour-quality, they manifest other similarities which appear to fall into a regular scale. It is noticeable that there is no scale of height in colour as fixed by the rapidity of vibrations of the several hues, and corresponding to the scale of mere pitch in music. The "lowest" note in the colour-scale, red, is more analogous in its effect to the higher musical notes. There seems to be a fairly even decline in respect of energy of sensation. Red is violent; yellow though brighter is less exciting; green is still less stimulating, while blue is the colour which best suggests repose. Of course these characters are greatly modified by variations in brightness or intensity. They apply to the average tones of these colours, and also to their spectrum-intensities.

Closely corresponding to this gradation in stimulative energy, is the division of colours into warm and cold hues. There is clearly a maximum of warmth in spectrum-red and a gradual falling-off through orange and yellow to green. But green and blue are generally treated as pretty equal in their coldness, if indeed green is not the colder of the two, as many artists suppose. The shading-off of blue into violet, again, is a clear return to the warm extremity of the scale.

Other peculiarities of the several colours may be found, some

¹ I cannot assign any reason why this subjective scale differs from Young's objective scale by the addition of the fourth element, yellow.

of which fall, like the above, into something of a general scale, as advancing and retiring colours, while others are confined to single colours, as the particular attractiveness which Goethe attributes to blue, the colour that woos us on by seeming to fly from us. But most attempts to define exhaustively the characteristic effects of the individual colours seem to involve arbitrary distinctions.¹

Let us now pass to those aspects of colours which vary in the case of a given individual tint. First of all there is the intensity or brightness of a colour which answers to strength of sensation and degree of stimulation. Opposed to this is darkness of hue, which is connected with feebleness of stimulation, and which in its lowest degrees is known as blackness. Each of these extremes has its characteristic emotional effect, brightness of colour being exciting and gladdening, while darkness of tint has a certain quieting and solemnising influence.²

Next to the aspect of brightness or darkness of a colour comes what is known as its degree of saturation or colour-force. It is known that even spectrum-colours are not perfectly pure from an admixture of white light, which tends to weaken their colour-force.³ In the case of coloured surfaces the admixture of white light tends to make the colour pale. The more saturated a colour the fuller its force as colour, the less saturated it is the nearer does it approach in its character to white. The two extremes of vivid colour and white are marked by a characteristic emotional effect. Colour is more sensuous, more voluptuous, produces a more voluminous mass of pleasurable feeling: white is less exciting and more serene.

In the case of coloured surfaces a colour may be made less saturated by being "broken" or mixed with neutral grey, which answers to a feeble quantity of white light. In this way the voluptuous colour-effect may be toned down. The extreme supplied by grey is a much quieter impression than white, and has something like a touch of sadness in it. Hence grey serves by contrast to bring out the rich voluptuous effect of colour still more powerfully than white, and in the case of all bright colours emphasises their brilliance as well. Of course the shade of grey

¹ See, for example, Wundt's recent attempt to define the characteristic emotional tone of the several colours (*Physiologische Psychologie*, pp. 440-444).

² A change in the degree of light-stimulus is sometimes attended with a change in the quality of the colour. Thus red or yellow light when very feeble gives the colour known as brown.

³ Helmholtz describes a very interesting experiment by which he was able to obtain a colour-impression fuller or more saturated than that of the spectrum (*Physiologische Optik*, p. 370).

may vary from something indistinguishable from white to perfect black. Every colour, however pure, tends, when it reaches a certain degree of febleness, to pass into grey and finally into black, as may be seen in the gradual change of nature's tints which accompanies night-fall. Black being the name we give to a surface which reflects the minimum degree of light is equally opposed to white and to colour. It serves to accentuate the brilliance or luminous quality of each.

Thus every colour presents itself as a triple series of gradations between the extremes of (*a*) bright tone and dark shade, (*b*) saturated colour and white, and (*c*) bright and saturated colour and grey or black. It is plain that these scales supply to any particular colour an indefinite number of distinct aspects, which aspects moreover, being common to all colours, afford points of affinity and contrast among different tints.

Let us now glance briefly at the way in which the principle of contrast enters into the combinations of colour. Contrast is the greatest degree of change or variety of impression, which is known to be a universal condition of art. It is only by change, by passing from one impression to another, that vividness of effect can be maintained, and the greater the degree of unlikeness between two impressions the more vivid the effect. Hence strong contrast is the most potent effect in art. There is no doubt that the aesthetic value of change and contrast rests on simple laws of the nervous system. On the one hand, a uniform unchanging impression tends to lose its effect through a gradual loss of functional vigour in the nervous elements involved. On the other hand, transition from one impression to another unlike this implies the excitation in the second case of elements not engaged in the first, that is to say, of elements with a plentiful store of vigour. Yet these considerations do not exhaust the phenomenon. The value of contrast depends on a consciousness of the relation between the contrasting impressions, and so involves a retention of a fairly vivid idea of the first impression. Thus the effect of contrast may be realised when there is no time for the exhausting effect just spoken of, *e.g.*, in passing from a high to a low tone very rapidly. In the case of colours which persist side by side, the effect of contrast may be instantaneous.

According to the double aspect of change just spoken of as relief after an exhausting impression, and a transition to a more vivid impression, various colours in juxtaposition may be said to relieve and accentuate one another. As the eye passes from one to another and reverses this movement, each element supplies at once a condition of repose and of new and vigorous effect. Yet we may roughly distinguish three cases here. First of all,

the contrasting colours may be both stimulating, being approximately equal in intensity or brightness and in extent. In this case which we may call that of equilibrium, and which is best illustrated by a juxtaposition of complementary colours, or colours nearly allied to these, there is the mutual effect of relief and intensification just described. Secondly, the two colours may be very unequal in stimulating force. If the weaker colour occupies the larger space and provides the ground of the brighter colour, as in arrangements of bright warm colours on grey or dark grounds, we have the effect of accentuation. If on the other hand the weaker colour appears as an incidental element in a large mass of bright colour, as in the Chinese and Japanese arrangements where small masses of black are scattered among bright colours, we have rather the effect of momentary relief or repose.

For the rest the pleasure of colour-combination increases according to the amount of discoverable contrast in which each term enhances the value of the other. More especially the characteristic effects of brightness and darkness, the essential element in *chiaroscuro*, and of energetic and restful colour, which again includes the opposition of warm and cold, enter as conspicuous features in the larger number of colour-schemes.

Variety and contrast are of the very soul of the colour-arts. The eye desires change, and the characteristic excellence of any particular colour is only seen when it is placed in surroundings fitted to bring out its specific quality. Just as nature delights the eye by its many variegated tints so the arts of colour seek to gratify it by the greatest possible variety of hue.

Yet change and the unlikeness of contrasting elements are only one desideratum in a combination of colours. There must be unity as well as variety, similarity as well as dissimilarity, supplying the peaceful feeling of harmony. The one principle opposes itself to and limits the other. If there were no unity variety would grow chaotic and confusing, while without variety uniformity would become monotonous. The degree of variety, moreover, is not always the same. Sometimes, where an exhilarating, highly stimulating effect is desired, variety and contrast abound, and the connecting thread of unity becomes faintly discernible. On the other hand, where a more peaceful impression is sought, variety may be reduced to a minimum. Let us see for a moment, in the light of the practice of the best colourists, how the principle of variety and contrast is limited in the case of colours.

In the first place, then, the least conspicuous action of the principle of unity in colours is seen in the preservation of a certain due *proportion* among the elements. One element must

not as a rule extrude another or domineer over it so as to destroy its force. This principle clearly embodies the idea of "perfect retinal activity" mentioned above. It furnishes the most abstract rule in colouring, and one which is exceedingly likely to be over-ruled by other principles. In applying it there is commonly a reference to the complete spectrum-scale of colour. This serves as a standard of complete organic unity, and any given scheme of colour is estimated with more or less distinct consciousness in relation to this scale. When all parts of this scale are clearly and adequately represented, the mind of the spectator has a sense of completeness, which feeling may be called an emotion of harmony, since it depends on a perception of a correspondence with a pre-existing mental standard. It is given as a rule of decorative painting by Mr. Owen Jones, that when seen at a certain distance the colours should seem to blend in a kind of neutral bloom.¹ In practice it is of course sufficient that the principal well-marked classes be represented. The favourite triads—red, yellow and blue, orange, green and violet, &c., owe a part of their æsthetic value to this principle of organic completeness. Similarly the value of complementary pairs, of the contrasts of warm and cold tint, and of light and dark, rests in part on this sense of completeness and proportion.

In the second place, colours may be united much more distinctly by help of the principle of *continuity* or *gradation*. It has already been suggested that the charm of gradation rests in part on the effect of blending impressions. In addition to this a gradation of colours pleases by giving us the sense of change in the gentlest possible form. It implies constant change together with the closest possible amount of resemblance short of uniformity. When colours are linked together by intermediate gradations, they are seen to have an affinity, they are recognised as links of one continuous chain. Light and dark (*chiaroscuro*) supply a second mode of gradation, which may with great advantage be combined with that of colour.

A third and yet higher mode of attaining unity among colours is by *subordination*. Ample variety of tint and of emotional tone being secured, the various details are grouped in relation to some central dominant element, sensuous or emotional. This principle is clearly opposed to that of completeness and proportion already spoken of. There are several recognised methods of securing the supremacy of a particular colour or quality of colour. For instance, the ruling feature may occupy by far the larger part of the area of the painting or design, either in a

¹ Mr. Field has worked out in his "Chromatic Equivalents" the ratio both of light-intensity and of surface requisite to this effect.

single mass or in a broken chain of smaller areas. Thus a landscape painter who seeks to realise a dominant key of bright gladsome colour may, instead of dividing his picture into two approximately equal masses of light and shade, expand and diffuse the light spaces, keeping the dark masses in strict subordination as an element of contrast and relief only. It may be remarked that the breaking-up of the dominant tint or quality of colour into several divided masses gives to the wandering eye the pleasure of recurrence of the like, a pleasure which is of the very soul of melody. Another mode of giving this supremacy is to assign to the dominant element a particular position, more especially a central one in the coloured space. By this means it will project its image on the most sensitive part of the retina when the eye is at rest, and also tend to arrest and hold the eye as the point of repose after each wandering through the peripheral parts of the surface.

The fourth and last mode of attaining chromatic unity is that of *assimilation*. When the highest degree of the emotional effect of harmony is desired, the colour-design must exhibit a considerable amount of similarity. In some cases a single uniform tint is esteemed agreeable, as for example, in ladies' dress and in domestic decoration.¹ Here the element of variety is supplied wholly by light and shade as distinguished from colour.²

More frequently the design is made up of a few closely related colours with their several tones and shades, as blues and greens, reds and browns, purple-reds and violets, &c. All such combinations of adjacent hues, provided they do not produce the discordant effect noticed above, supply a large amount of the feeling of harmony, since they are related not only in chromatic quality, but in those characters of warmth, strength, &c., or their opposites, already spoken of. A combination of colours may be assimilated in some cases by a process of suffusion, one colour being apparently laid over a number of colours. The only difficulty here is that of preserving something of the individual colours. This is only possible when the dominant and subordinate lights result in a certain colour that has something of the chromatic quality of each, that is to say, when the colours are not separated by a wider interval than that of the second degree of affinity (as red and yellow). The effect of the medium of the air on distant

¹ This fact appears to be overlooked by Mr. Grant Allen (*Physiological Aesthetics*) who seeks to resolve all the disagreeableness of colour-combinations into a fatiguing excitation of one class of nervous elements only.

² This is not exactly true, as change in degree of light is, as I have observed, sometimes accompanied by change in the chromatic quality.

colours illustrates this effect of suffusion, and the same effect is sometimes aimed at in art.

The higher degrees of similarity just spoken of are only aimed at when the fullest effect of harmony is desired. More commonly the artist is content to secure a lower degree of harmony by means of some unobtrusive emotional affinity. Thus, for example, a refreshing and serene character belongs to the colour-scheme of certain marine studies with morning light, in which bright tones of green and blue together with white predominate, while all warm and exciting tints are either excluded or reduced to a very inconsiderable element.

There are two methods of bringing colours together by means of some common character which appear to be so well recognised in art as to call for special attention. The first of these is known as breaking or lowering the tone of colours by bringing them nearer a shade of neutral grey (or black). In this way the individual differences of the colours are softened though not altogether lost. Imagination here supplements sense and restores to some extent the half-veiled hues. The most delightful examples of such subdued colours in peaceful harmony may be observed among the tints of sea and sky on a calm cloudy day. The present taste in decorative art and in dress illustrates the quiet harmonious effect of such subdued colours. When the colours are reduced to a very low shade, and made to approach black, we have a peculiar rich emotional effect which appears to involve an energetic action of the imagination.

The second mode of approximating colours to one another is by means of their other common pole, namely, white. To mix white light with coloured, or to make the colours pale and faint, is to bring them together by another link of affinity. Although this kind of harmony is less frequently sought in art than the other, illustrations of it are not wanting. Slight water-colour sketches on white ground appear to owe something of their peculiar charm to this principle, and in certain styles of colouring, *e.g.*, that of the Chinese and Japanese, there seems to be a preference for combinations of pale tints.

Such then are, so far as I can observe, some of the chief modes of supplying the peculiar element of unity, affinity or harmony in combined colours by means of some colour-element. It must not, however, be supposed that this kind of unity is invariably aimed at. As I have already remarked, the artist who seeks to produce a highly stimulating effect will make use of the greatest amount of variety and contrast in colour. In these cases he may be content with giving to his scheme simply the unity which comes of local connexion and symmetrical form. How much of the peculiar effect of colour-harmony will be

sought depends on the particular aim of the painter and on his individual feeling.

In closing this slight study of the principles of chromatic combination a word may be said as to the influence of experience and association on the æsthetic effects of colours in juxtaposition. I have refrained from enlarging on this side of the subject here, not because I think it unimportant, but because it seems to me better to study all the elements directly presented to us in art before asking how much is indirectly given us by revivals of past experience, individual or racial. In addition to this I will confess that, with respect to the effects of colour in combination, this line of speculation appears to me to promise but little help. It is easy to trace some of the effects of single colours to this source. Thus bright colour is gladsome in part, because it is associated with all the pleasurable feelings that arise from sunshine and bright surroundings. Again warm energetic colours, no doubt, owe some of their peculiar force on the mind to the fact of their comparative scarcity in the variegated mantle of nature, as well as to association with sensations of bodily warmth, &c. On the other hand, it is not easy to see why, if we refer simply to the arrangements of nature and their action on the visual organism, grass-green and blue should not be reckoned one of the most agreeable of combinations. One or two conjectural explanations might be derived from this source, as, for example, that combinations of closely-related colours are pleasing since they constantly present themselves on the surfaces of natural objects, or that gradation owes something of its æsthetic value to its place in the colour-plan of nature. But such tentative suggestions are very unsatisfactory, while on the other hand, the laws of colour-harmony, so far as any such laws can be said to exist, seem to be pretty fully accounted for by data immediately given us, that is to say, the structural peculiarities of the visual organ and the general laws of nervous stimulation, together with well-known principles of mental action.

JAMES SULLY.

III.—THE STANHOPE DEMONSTRATOR,¹

AN INSTRUMENT FOR PERFORMING LOGICAL OPERATIONS.

CHARLES third Earl Stanhope² is known to science by his mechanical inventions. The works to which he owes his celebrity are chiefly the following:—A printing press and a microscopic lens, both of which bear his name, a method of securing buildings from fire, an arithmetical machine, a monochord for tuning musical instruments, certain improvements in the process of stereotype printing and in the construction of locks for canals, and a steamboat or, as it was described by its inventor, a vessel to sail “without the aid of either wind or tide or oars”. But it does not seem to be generally known that the Earl devoted a large portion of his life to the study of Logic, and that he invented an instrument for the mechanical performance of logical operations. In none of the accounts which have appeared of his scientific labours can we find any allusion to his researches on this subject or to the curious contrivance which he called the “Demonstrator”. His logical speculations, which employed his thoughts more or less during a period of thirty years, have remained absolutely unpublished and unnoticed down to the present time. This is partly to be accounted for by the fact that the two friends to whom alone he communicated his views were not at liberty to make them known to others. In a letter to the Rev. John North of Ashdon, near Saffron Walden, Essex, written the year before he died,³ he gives some account of his logical method, and asks him to show the same to “Dr. G.,” meaning no doubt Dr. Edmund Goodwyn,⁴ but

¹ The substance of the following article was communicated by the author to Section A of the British Association at the meeting in Dublin, 1878.

² Born 3rd August, 1753; died 15th December, 1816.

³ The letter bears date 15th November, 1815.

⁴ Goodwyn, a doctor of medicine at Ashdon, and North were two of Stanhope's executors. There were eight others, viz., Lord Holland; Lord Grantley; Mr. George Dyer, B.A., of 6 Clifford's Inn; Rev. Christopher Wyvill of Burton Hall, near Bedal, Yorkshire; Rev. John Robinson of Halstead, Kent; Joseph Jekyll, Esq., M.P., of New Street, Spring Gardens; Rev. George Gregory, of 10 Chapel Street, Bedford Row; and Mr. David Stone, surgeon, of Brasted, Kent. To his executors he left nearly all his disposable property. Among some of their descendants may perhaps be found letters or manuscripts relating to the subject of this article. The reason why he left nothing to his family, except one thousand pounds to his mother, is thus explained in an obituary notice which appeared in the *Gentleman's Magazine* for 1816, Vol. 86, part 2:—“On his separation from Mr. Pitt his family preferred the patronage of the minister to the paternal

to no one else lest "some bastard imitation" should precede his intended publication on the subject. A work entitled "The Science of Reasoning clearly explained upon new principles," which he left unfinished, bears on its title-page the date 1800. A few of the earlier chapters were printed by the Earl at his own press at Chevening, but the work for the most part is in manuscript, and some portions of it have been written and revised several times.¹ It is occupied chiefly with questions of logical definition and examples of a method of reducing all propositions to one form. The chapters on the ratiocinative part of logic, or that which relates to reasoning, had not been written, and we have to collect the author's views on this branch of the subject from some isolated examples and a few incidental hints.

Prof. Jevons, in a paper² describing his own logical machine, remarks:—"It is rarely indeed that any invention is made without some anticipation being sooner or later discovered, but up to the present time I am totally unaware of even a single previous attempt to devise or construct a machine which should perform the operations of logical inference; and it is only, I believe, in the satirical writings of Swift that an allusion to an actual reasoning machine is to be found." Now it must be confessed that Earl Stanhope's Demonstrator is much less powerful as a logical instrument than Prof. Jevons's machine, but the former is undoubtedly a distinct "anticipation" of the latter. It is probably the first attempt ever made to solve logical problems by mechanical methods. That it is inferior in range and power to the more recent invention can hardly be matter of surprise. Logical science has made considerable progress since the commencement of the present century. The Aristotelic system has been widened in various directions, and the remarkable analysis of Boole³ has served to exhibit the laws of thought in logic in a form as rigorous and exact as that of

roof, and he has frequently been heard to say that as they had chosen to be saddled on the public purse, they must take the consequences. He wished them all to devote themselves as he had himself done to some useful calling, by which, when the fatal day of public calamity, which he imagined he foresaw, came, they might secure independence by their own personal ingenuity and labour. They are therefore not mentioned in the will, but they are all entitled to certain sums by the marriage settlement."

¹ These remains with all letters preserved relating to Logic have been placed in the writer's hands by the present Earl with a view to the publication of this account.

² "On the Mechanical Performance of Logical Inference."—*Philosophical Transactions*, 1870, pp. 497-518.

³ *An Investigation of the Laws of Thought*, London, 1854.

any department of pure mathematics. Prof. Jevons has attacked the problem of a mechanical logic with all the advantages of these discoveries, and the result is an instrument as incomparably superior to the one I am about to describe as the method of Boole is to the old scholastic system.

It is interesting, however, to observe that in seeking to construct a mechanical method in logic Earl Stanhope was led to anticipate some of the views of modern logicians. Both in his quantification of the predicate and in his solution of problems involving numerically definite propositions, we see the Earl struggling, not unsuccessfully, to escape into some less confined system of logic than that of Aristotle. Indeed it would seem that without some advance on the Aristotelic doctrine a mechanical logic would be impossible.

Earl Stanhope showed little respect for the authority of the ancient logicians. The same reforming zeal which he is well-known to have displayed in politics¹ he exhibited also in his treatment of logic. He brought to the study of the subject a certain independence and originality of thought which led him to examine the foundations of the science for himself. "Logicians in general," he says, "consider propositions as being of four kinds, and they distinguish them by four letters as follows:—

- | | | |
|----------------------------|-----------------|----|
| 1. Universal affirmative, | } The letters { | A |
| 2. Universal negative, | | E |
| 3. Particular affirmative, | | I |
| 4. Particular negative, | | O. |
- by which they denote them are

"And they represent syllogisms by means of certain barbarous words (such as *Barbara*, *Cesare*, *Darapti*, &c.), which words contain combinations of some of those four letters. I shall reject the whole of this." So elsewhere he says: "I intend to exclude entirely that long *catalogue of pedantic words* which are now used in that complex system for the purpose of drawing consequences, and which render it, generally speaking, both unintelligible to youth and unfit for men of any age, so far at least as relates to convenient and habitual use. My system of logic will, on the contrary, be found to have the striking advantage of uniting simplicity, perspicuity, utility, and perfect correctness." Again:

¹ At an early period of the French Revolution he openly avowed his sympathy with republican sentiments, and he is even said to have gone so far as to lay aside the external ornaments of the peerage. His advanced views were developed in his "Speeches and Protests before the Electors of Westminster" in 1784, and in his "Reply to Burke on the French Revolution". A curious pamphlet, entitled "Stanhope's Political Opinions," by S. Fletcher, was published shortly after the Earl's decease. Copies of these works are in the British Museum (8132d, ¹¹⁰³⁹/₄ 58, 8135cc).

—"The famous Locke, in his *Essay concerning the Human Understanding* (Volume the Second, Chapter the Seventeenth and Section the Eighth), says, 'It is fit to take notice of one manifest mistake in the *Rules of Syllogism*, viz., that no *Syllogistic Reasoning* can be right and conclusive but what has at least one *general Proposition*'. The natural acuteness of that great man made him perceive the existence of what he terms a '*manifest mistake*'. But not seeing exactly in what consisted that method by means of which that error was to be universally corrected, he leaves the subject without attempting to lay down correct *Rules of Syllogism*. I shall make it my business to supply that defect. And I shall produce such examples, relative to my new system of *Logic*, as will clearly justify the sagacious Locke, in the observation which I have quoted respecting the '*manifest mistake*,' as he sarcastically calls it, of the logicians. There are various other mistakes which they have made which I must rectify. But I shall not stop to correct any of these in detail. For the Science requires to be *totally reformed*."

The materials in our possession do not enable us to give a complete or systematic account of Stanhope's views on logic, nor is that the object of the present paper. What we propose to do is to bring out, so far as we have been able to collect them, those points in his system which may serve to illustrate and explain the working of his Demonstrator. On this subject we find in the Earl's logical remains no full or formal statement, but only scattered and fragmentary hints, and a few very simple examples. It is possible therefore that in the hands of its noble inventor the instrument possessed a range and power somewhat greater than is apparent to us. He attached to it a practical importance; for us it possesses little more than a theoretic or an historic interest. After an allusion to his arithmetical machine,¹ constructed in 1777, the Earl says:—"Another instrument which I have invented, and which is extremely simple in its construction, is contrived in such a manner as to be useful in *discovering Consequences in Logic*. It exhibits the consequences *symbolically*, and renders them evident to the mind. By the aid of this instrument the accuracy or inaccuracy of a conclusion is always shown, and the reason why such consequence must of necessity exist is rendered apparent. As this instrument is so constructed as to assist us in making *demonstrations*, I have termed it the DEMONSTRATOR. This same instrument is so peculiarly contrived as likewise to exhibit symbolically those proportions or degrees of

¹ Four of these machines are in existence; one is in the hands of the present Earl, two others, of like construction, have come into the possession of General Babbage, and the fourth, a much smaller and less effective instrument, is at present in the custody of the writer.

probability which it is the object of the LOGIC OF PROBABILITY to discover." Speaking elsewhere of his one universal rule of mediate inference, he exclaims: "Behold, then, the luminous perspicuity and most beautiful simplicity of this new system of logic!"

It will be convenient to cite here Stanhope's definitions of the following terms, *viz.*, *class*, *opposite class*, *original opposite class*, and *subordinate opposite class*.

Class. "An individual thing which alone possesses, or the total number of things each of which possesses, either any given quality or an assemblage of given qualities, is that which I call a *class*."

Opposite class. "When any number of things is, by means of any definition, divided into any two classes only, which are perfectly distinct from each other; then each such class, when considered in relation to the other class, is that which I call the *opposite class*."

Original opposite class. "Any opposite classes into which the total number of all things is divided are those which I call *original opposite classes*."

Subordinate opposite class. "Any opposite classes into which any class is divided are those which I call *subordinate opposite classes*."

All propositions are reduced by Stanhope to one form, namely, the expression of the identity of two or more things, or classes of things. In a letter to North bearing date 8th November, 1811, he says:—"I take any two of my opposite classes, which I will call A and B, B meaning whatever is not A. When I predicate with respect to A and B, that is, when I form any proposition, true or false, or positive or negative, upon the subject in question, I either aver the thing which I will call C to be in the class A, which denies it to be in B, or I aver it to be in B, which averment denies it to be in A. If I deny, I do the same thing in another form of words. Now it is evident that when I aver that C is in or of the class A, I only aver it to be *identical* with something in or of that class, and that I do and can do nothing else." In the same letter he replies to an objection which North had raised to his definition of a proposition as "an averment of identity". North had written, 4th Nov. 1811:—"I am the less inclined to admit it [namely, the principle of identity], unless I had seen the induction by which it has been formed, because I have read what Condillac had said of the principle itself, and because I could not see that he advanced in any degree the science to which he attempted to apply it, even though Geometry might seem the most promising of any other of the sciences. For my own part I confess that his demonstra-

tion fatigued and puzzled me beyond my powers of describing. *L'âme est un être pensant* is a proposition which may be of use in argumentation, but its equivalent (according to Condillac and your Lordship) *L'âme est l'âme* conveys no idea; consequently if such an identic proposition were inserted in any argumentation, it would be so far from forming a step to facilitate our progress that it would present a most insurmountable barrier to our passage: such identities would inevitably bar up every avenue to knowledge." The answer given by Stanhope to this objection throws much light on his general views of the proposition. "When I talk of identity," he says, "I do *not* say, as you make me say, que '*L'âme est l'âme*,' car cela ne dit rien, but I say thus: Example. Suppose I had heard that there was such a thing as a *comet*. I now perceive in the heavens at night a *star with a luminous tail*; that is all I know, and it is by means of that mental description that I distinguish that star from all other stars. I afterwards find my star, so distinguished, described and defined, amongst the stars of some new constellation, and I predicate that that star *has moved fast*, which is a quality of my comet, but which quality of my comet was before to me unknown; that is to say, I aver that 'the star with a luminous tail' and a star which 'moves fast,' that is, which belongs to the *class of stars that move fast*, are IDENTIC. Have I not made an advance in knowledge by my having so perceived, though in point of fact, it is the *same* comet, the *identical* comet, originally described by me incompletely, before I perceived, or could predicate, such identity? *Voilà tout*. Would it not sound to your ears very droll if a person were to say that *that star moving fast* means that it is identic with some star which does *not move fast*? Now if that would be evidently wrong, and if I have by my method *only two opposite classes*, viz., stars *moving fast* and stars *not moving fast*, if the proposition in question does not mean that the given star is *identic* with a star in the second class, it must mean that it is identic with a star in the first class; for there are *two* classes only. This is my induction in other words."

The "method of identification," as the author calls it, is illustrated in "The Science of Reasoning" by numerous examples, from which the following are selected:—

"All triangles are trilaterals" means ("there being no difference between triangles and trilaterals, except as to the form of their respective definitions,") that "the class of *all* triangles and the class of *all* trilaterals are identic." "Pure silver is fusible" means that "All pure silver and *some* of those things which are fusible are identic". "Hardness belongs to diamonds," means that "*Some* of those things which possess the quality of hardness and *all* diamonds are identic". "Some printing presses

cannot be worked without great labour," means that "*Some* printing presses are identic with *some* of those instruments which cannot be worked without great labour".

Readers of MIND will readily recognise in these examples an anticipation of Mr. George Bentham's four forms of affirmative propositions; forms which were afterwards adopted by Sir William Hamilton.¹ But Bentham, Hamilton, and others who start from the same principle could have known nothing of Stanhope's system.

This "method of identification" is applied to negative propositions which are "translated," that is, changed in form to affirmative ones. Any two mutually exclusive classes, called by Stanhope "opposite classes," A and not-A, divide the universe between them; and to deny that a thing belongs to one class is, in effect, to affirm that it belongs to the "opposite class". "When a man denies that a given thing is probable, he, in effect, avers that such given thing and one of those things which belong to the opposite class of probable [*sic*] things are identic." "No diamond is either ductile or magnetic," means that "Each diamond and something which is neither ductile nor magnetic are identic". "A flint is not ductile, means that All flints and some things which are not ductile are identic. Or, in other words, that All flints and some of those things which are in the opposite class of ductile things are identic." "No man is perfect, means that All men are imperfect." Generally, "No A is M" is equivalent to "All A is identic with something that is not M"; and in like manner, "Some A is not M" is equivalent to "Some A is identic with something which is not M". "This may also," says Stanhope, "be expressed *positively*. For if whatever be *not* M be called N, then the aforesaid negative proposition, Some A is not M, would also mean substantially that *Some* A is identic with *some* N. Or, in other words, that *Some* A is N." So, in a letter to North dated 27th Oct. 1811, he says: "A *negative* and a *positive* proposition, on my plan, are always one and the same. For to affirm a given thing to be of any 1st class or 2nd class is at the same time and of necessity, to *deny* it to be of the *class opposite*. And to *deny* a given thing to be of the 1st class or 2nd class is of necessity to *affirm* it to be of the *class opposite*. And *vice versa*. So that, when we *either* affirm or deny, we must do both, *sans le vouloir*."

Two other examples of affirmative propositions may be here cited. "This man exists," is equivalent to "One man and one

¹ Bentham, *Outline of a New System of Logic*, London, 1827.

Hamilton, *Discussions on Philosophy*, London, 1852. Art. IV. "Logic," first published in April, 1833.

individual who exists are identic". "A flint is on that table," means that "One flint and one thing which is on that table are identic".

It will be seen from the foregoing illustrations that Stanhope based his system on what De Morgan calls the *arithmetical* view of the proposition. He looked rather to the extension of terms than to their other capacity of intension. He regarded the sign of quantification affecting any term as indicating, definitely or indefinitely, how many objects were included in the "totality" described by that quantified term. By the method of identification every proposition, whether affirmative or negative, universal or particular, numerically definite or otherwise, is reducible to the form α A's are identic with β B's, where α and β , the signs of quantity, may be *all*, *some* (not all or possibly all), *most* (more than half), *fewest* (less than half), a number (an integer), or a definite ratio of part to whole (a fraction), but not *none*. According to Stanhope, α A and β B are to be regarded as "the same totality differently described". He distinguished between an averment of identity *qui ne dit rien*, such as Snow is snow, and an averment of identity *qui dit quelque chose*, such as Snow is white. He discarded the former as not available for logical purposes, and admitted only the latter into his system.

Whatever the signs of quantity, the total number of objects included in one "totality" α A is equal to the total number of objects included in the other β B, and therefore when α and β are both numbers, they are equal. But when α and β are both ratios, they are to one another inversely as the total number of A's to the total number of B's. This is easily shown. For let ω_1 be the whole number of A's, and ω_2 the whole number of B's; then $(\alpha \omega_1)$ A's are identic with $(\beta \omega_2)$ B's, where $(\alpha \omega_1)$ denotes the product of α into ω_1 and $(\beta \omega_2)$ the product of β into ω_2 .

Hence $\alpha \omega_1 = \beta \omega_2$, or $\frac{\alpha}{\beta} = \frac{\omega_2}{\omega_1}$. When α is a ratio and β is a

number, $\frac{\alpha}{\beta} = \frac{1}{\omega_1}$; and when α is a number and β is a ratio,

$$\frac{\alpha}{\beta} = \omega_2.$$

This view of the proposition determines the form of Stanhope's method of mediate inference and leads to an extension of the common doctrine. He proposes a rule "for discovering consequences in logic" which is a remarkable anticipation of that given by De Morgan for the numerically definite syllogism. It is a noteworthy fact that Stanhope does not limit the rule to a special form, but puts it forth as embodying the fundamental principle of all syllogistic ratiocination. We know not how he

was led to frame it, whether by the study of the numerical syllogism, or by some more general considerations. We suspect the former. But certain it is that he announces it as a rule capable of universal application. Two forms of it are given, one symbolical, the other mechanical. To enable the reader to understand the former, it will be necessary to give the author's definitions of *ho*, *los* and *holos*; and to enable him to understand the latter, it will be necessary to describe the construction of the Demonstrator.

DEFINITIONS. "Whenever in the *first*¹ premise any totality, or any part thereof, and any given thing or things are stated to be identic, and whenever in the *second* premise (such second premise not being incompatible with the first) that same totality, or any part thereof, and any other given thing or things are stated to be identic; then such totality itself is that which I call *holos*. I have chosen the word *holos* because that word (*ὅλος*) in the Greek means whole. Such *holos* or such part of *holos* as is mentioned in the first premise as being identic with any given thing or things, is that which I call *ho*. Such *holos*, or such part of *holos* as is mentioned in the second premise as being identic with any given thing or things, is that which I call *los*. The reader will observe that *ho* as well as *los* may be identic with *holos*, but that neither *ho* nor *los* can ever exceed *holos*."

RULE. "Add *ho* to *los* and subtract *holos*. Then the remainder (if any) is the extent of the consequence. But if there be no remainder, or if there be no *holos*, then there can be no unconditional consequence."

In fact *holos* is the "middle term" of ordinary logic quantified universally, and *ho* and *los* are the extreme terms with their proper signs affixed, "distributed" or "undistributed" as the case may be. But Stanhope avoids the language of ordinary logic. In place of "the middle term" he speaks of a totality, by which however he means the middle term quantified to the extent of the universe of thought. In place of "distributed" and "undistributed," he speaks of "whole" or "total" and "part"; and in place of "quantity" he speaks of "extent". He might have retained the language, enlarging the definitions, of ordinary logic, but he preferred to employ a new nomenclature.

By "the extent of the consequence" Stanhope means the extent as measured by *holos* or the middle term distributed. Thus if α M's are A's and β M's are B's, and μ M denote the total number² of M's about which we are reasoning, then Stan-

¹ The order of the premises is, in Stanhope's system, immaterial; whichever premise happens to be presented first is that which he calls the first.

² When α and β are ratios of part to whole, or fractions, μ is unity.

hope's rule gives $(a + \beta - \mu)$ M's are both A's and B's, that is to say, $a + \beta - \mu$ measures the extent of the consequence as between A and B. In other words, As many A's are B's as the sum of a and β exceeds μ . The method shows at once when such a conclusion as Some A's are B's, or Some B's are A's, is valid, and when it is not, and it also defines the extent of the "some" with reference to μ M or *holos*. At all events it gives what has been called the "minor limit". Further, it enables us to draw a conclusion in some cases where the common logic would be powerless. Stanhope gives an example which is evidently intended to illustrate his remarks, which we have already quoted, on Locke's objection to the commonly received doctrine—"that no Syllogistic Reasoning can be right and conclusive but what has at least one general Proposition".

"Suppose I were to say, *some* of the five pictures in that room hang on the north side. And *some* of those five pictures are portraits. No conclusion can in this case be deduced; and the reason is, because from the two *undeterminate words*, *some* and *some*, which are respectively contained in the two premises, it does not appear *how many* of those five pictures hang on the north side of the room, nor *how many* of those five pictures are portraits. But without introducing any *general* proposition, I can word those two premises (which are both of them assertions respecting *particulars* alone) so as to render a conclusion absolutely necessary. I shall do it by introducing precision into each premise; as, for example, suppose I were to say *three-fifths* (which is most certainly not *all* but only *some*) of the five pictures hang on the north side of the room. And *four-fifths* (which is also most indisputably not *all* but only *some*) of the five pictures are portraits. Therefore at least *two-fifths* of the pictures (that is to say, at least two of the five) must at the same time be portraits and hang on the north side of the room."

This conclusion is given by the rule thus, $ho + los - holos = \left(\frac{3}{5} + \frac{4}{5} - 1\right)$ pictures = *two-fifths* of the pictures, or $(3 + 4 - 5)$ pictures = two of the pictures. That is to say, at least *two-fifths* of the pictures, or what is the same thing, *two* of them, are portraits hanging on the north side of the room.

A good example is given by De Morgan. Most men in a certain company have coats. Most men in the same company have waistcoats. Therefore some in the company have both coats and waistcoats.

Here by Stanhope's rule

$$ho + los - holos = (\text{most} + \text{most} - \text{all}) \text{ men} \\ = \text{some men.}$$

That is, Some men in the company have both coats and waistcoats.

As another illustration, let the premises be

No boaster deserves respect.

Some heroes are boasters.

According to Stanhope, the first proposition is equivalent to

All boasters and some persons who do not deserve respect are identic.

And the second to

Some heroes and some boasters are identic.

Hence, by the first proposition, *ho*=*holos*, and the conclusion in this case is

ho + *los*—*holos*=*los*=some boasters.

That is, Some heroes (to the extent of Some boasters) are persons who do not deserve respect.

It appears therefore that the rule applies with equal effect whether the signs of quantity in the given premises be numerically definite, semi-definite or wholly indefinite. The arithmetical view of the proposition and syllogism is carried out to the fullest possible extent. By "all," used as a sign of quantity, is understood *every one*, or the *total number*, and by "some" is understood an *indefinite number* which may or may not equal the *total number*, but cannot mean the *absence of number*.

The Demonstrator is a simple contrivance for the mechanical working of this rule. It consists¹ of a brass plate four and a half inches long and four inches wide, affixed to a block of mahogany three quarters of an inch thick. In the centre there is a "square opening" or depression, about an inch and a half in area, and half an inch deep: this is called by Stanhope the *holon*. Across the *holon* two slides can be pushed; one, which is set in a slender mahogany frame, is of red transparent glass, and cannot be wholly withdrawn from the instrument; it works through an aperture on the right. The other is of wood, and seems to have been originally coloured gray, but to have become in the course of time bleached; this is spoken of by Stanhope as "the gray slider". In working the "Rule for the Logic of Certainty" this slide is passed through an aperture to the left; but in working another rule given by Stanhope, the "Rule for the Logic of Probability," it is drawn out and inserted in an aperture at the top, when of course it works at right angles to the red slide. In each case, when the slides are pushed in, the

¹ Earl Stanhope devised and caused to be executed several instruments of various sizes and constructions for the same purpose. The most convenient is the one described in the text, of which there are duplicates. One of these has been presented to the writer by the present Earl; the other is retained in the family. It is probable that this was the last form of the instrument which Stanhope devised. The others are less simple in construction and less effective in operation.

red covers the gray (or white). On the lower edge of the red slide, and on the upper edge of the square opening, the numerals

0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

are printed, with a white dot on a black ground opposite to each numeral. The same scale, running from top to bottom, is printed on the left side of the square opening. These scales serve to indicate the extent to which the slides are pushed in.

On the face of the Demonstrator various rules and explanations are given, as in the accompanying diagram which represents the appearance of the instrument when both slides are pushed fully in.

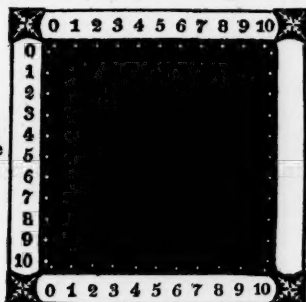
DEMONSTRATOR,

INVENTED BY

CHARLES EARL STANHOPE.

The right-hand edge of the gray points out, on this upper scale, the extent of the gray, in the logic of certainty.

The lower edge of the gray points out, on this side scale, the extent of the gray, in the logic of probability.



The area of the square opening, within the black frame, represents the holon, in all cases.

The right-hand side of the square opening points out, on this lower scale, the extent of the red, in all cases.

The right-hand edge of the gray points out, on the same lower scale, the extent of the consequence, (or dark red,) if any, in the logic of certainty.

Rule for the Logic of Certainty.

To the gray, add the red, and deduct the holon: the remainder, (or dark red,) if any, will be the extent of the consequence.

Rule for the Logic of Probability.

The proportion, between the area of the dark red and the area of the holon, is the probability which results from the gray and the red.

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FIG. I.



FIG. II.

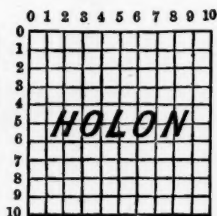
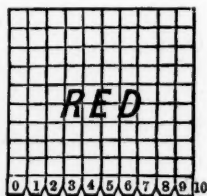


FIG. III.



By means of two plain cards and a sheet of paper any one can construct a Demonstrator for himself. For, on the sheet let a square be described, and let it be divided into one hundred equal squares; also let the numerals 0 to 10 be written on the upper and left side as in Fig. II. This may be called the *holon*. Next, let the cards be cut each of exactly the same size as the *holon*, and let them be similarly divided into squares. One of these, Fig. I, may be used instead of the gray slide, and the other, Fig. III, bearing on its lower edge the scale 0 to 10, instead of the red. It will be found convenient to snip the lower edge of the red card as in the last figure, so that when the gray is placed upon the *holon* (being brought on from the left for the logic of certainty, and from the top for the logic of probability) to the extent required by the first premise, and the red (being brought on from the right) to the extent required by the second premise, the extent to which the red overlaps the gray (which is the extent of the "dark red" in the instrument) may be at once apparent. Any problem which can be solved by means of Stanhope's Demonstrator can be solved equally well by means of these squares.

The following examples will sufficiently illustrate the working of the instrument.

1. All M is A.
All M is B.

Let the *holon* represent "All M". Place the gray slide to the extent of the *holon* to represent "Some A," and the red slide also to the extent of the *holon* to represent "Some B". Then the extent of the "dark red," that is, of the "union of the gray and the red," which in this case is the extent of the *holon*, is the extent of the consequence, and the instrument shows that

Some A is B, or Some B is A.

This is the conclusion of the common logic; but the conclusion

given by the Demonstrator is somewhat more full and definite, viz.—

As many A's are B's, or as many B's are A's, as there are M's in all.

2. All jewels are valuable.

All diamonds are jewels.

Let the holon represent "All jewels," and place the gray slide to the extent of the holon to represent "Some valuable things"; and the red slide to any extent to represent "All diamonds". The dark red is the extent of the consequence. Here the extent of the dark red is the extent of the red, and the instrument shows that

All diamonds are valuable; or some valuable things are all diamonds.

3. No M is A.

All M is B.

These premises are equivalent to

All M is some not-A.

All M is some B.

Let the holon represent "All M"; and place the gray slide to the extent of the holon to represent "Some not-A," and the red slide to the extent of the holon to represent "Some B". The dark red which shows the extent of the consequence has in this case the same extent as the holon: the red is entirely gray, and the conclusion is

Some B is not-A,

or more definitely,

As many B's are not A's as there are M's in all.

4. No M is A.

All B is M.

These premises are equivalent to

All M is some not-A.

All B is some M.

The holon representing "All M," place the gray slide to the extent of the holon to represent "Some not-A," and the red slide to any extent to represent "All B". The dark red, showing the extent of the consequence, has in this case the same extent as the red: the red is entirely gray, and the conclusion is

All B is some not-A,

or, as expressed in the usual form, No B is A.

5. No M is A.
No M is B.

These premises may be written

- All M is not-A.
All M is not-B.

Let the holon represent "All M," the gray, pushed in to the extent of the holon, "Some not-A," and the red, pushed in to the same extent, "Some not-B". The instrument shows that

Some not-A is not-B, or Some not-B is not-A,
or, more definitely,

As many not-A's are not-B's as there are M's in all.

This conclusion would not be accepted as valid in the scholastic system of logic, which virtually requires that the subject of a proposition should be affirmative. It is, however, perfectly legitimate in itself, though, as Stanhope says, "there is no conclusion as between A and B".

6. Some M is A.
Some M is B.

The holon representing "All M," place the gray slide to any extent to represent "Some A," and the red slide to any extent to represent "Some B". Here it is doubtful if the red will overlap the gray so as to give dark red, and therefore no certain conclusion can be drawn. When the number of objects denoted by the term "Some M" in the first premise added to the number denoted by the term "Some M" in the second, exceeds the total number of M's, the red will overlap the gray, that is to say, there will be some dark red, and in that case we can conclude that

Some A is B, or Some B is A.

7. Of ten trees seven are above 90 feet high.
Of the same ten trees six belong to Mr. North.

Let the holon represent the ten trees. Place the gray slide to the extent of 7 to represent the trees above 90 feet high; and place the red slide to the extent of 6 to represent the trees belonging to Mr. North. Then the instrument shows 3 as the extent of the dark red, so that the conclusion is that

There are three trees above 90 feet high belonging to Mr. North.

There may be more than three, but the instrument gives the "minor limit," the number *at least* which belong to Mr. North. If the red slide, with its scale reversed, were pushed in through

the same aperture as the gray to the proper extent, the dark red, or the union of the red and the gray, would indicate the "major limit," the greatest number that can belong to Mr. North, *viz.*, 6.

8. Of ten pictures eight are portraits.

Of the same ten pictures four are by Rubens.

The holon representing all the pictures, place the gray slide to 8 to represent the portraits, and the red to 4 to represent the pictures by Rubens. Then the dark red shows the number of portraits by Rubens, *viz.*, 2. This is the "minor limit"; the "major" is shown by the red, *viz.*, 4.¹

9. Mr. Venn's Problem.² "The members of a board were each of them either bondholders or shareholders, but not both, and the bondholders, as it happened, were all on the board. What conclusion can be drawn?"

Let the holon represent the whole body of bondholders and shareholders. Place the gray slide to any extent to represent "All bondholders," or, what is here the same thing, "All directors who are bondholders"; and place the red slide to represent "All shareholders". There must be no dark red, that is, the red must not overlap the gray, because no director is both a bondholder and a shareholder, but the red and the gray must together cover the holon. Then the instrument shows that

No shareholder is a bondholder,

the conclusion required.

The mechanical process does not seem to differ essentially from Mr. Venn's argument, than which, as he says, nothing can look simpler *when stated*:—"There can be no bondholders who are shareholders, for, if there were, they must be either on the board or off it. But they are not on it, by the first of the given statements; nor off it, by the second."

Stanhope's letters and papers contain no examples in illustration of his "Rule for the Logic of Probability," nor do we find in them any remarks on the general subject. But the rule solves effectually either of the following problems, *viz.*,

(a) Given the probabilities of two independent events, to find the probability of their concurrence; or

(b) Given the probability of one event, and the probability

¹ To the riddle, "Two ducks before a duck, two ducks behind a duck, and one duck in the middle. How many ducks were there?" The answer often given is 5; but the answer required is 3—the least number or "minor limit".

² See article by Mr. Venn on "Boole's Logical System," in MIND IV., p. 487.

that if that event occur, another dependent on it will happen also, to find the probability of their concurrence.

For, in either case, if p and q be the given probabilities, the required probability will be $p q$, as has long been known. And the instrument, when the gray slide is pushed through the upper aperture to the extent of p of the holon, and the red is pushed in to the extent of q of the holon, simply indicates the product of the two ratios p and q , each less than unity; for the extent of the dark red is evidently $p q$ of the holon.

10. A coin is tossed up twice; find the chance that it will fall head uppermost both times.

The chance of head in a single throw is $\frac{1}{2}$. Let the holon represent certainty. Place the gray slide, now inserted through the upper aperture, to the extent of 5, one-half of the holon, to represent the chance of head; and place the red slide to the same extent to represent the same chance; then the dark red is obviously one-fourth of the holon, and $\frac{1}{4}$ is, by the rule, the chance that the coin will fall head uppermost twice. We should have precisely the same process and result if the question were to find the chance of the coin falling head first and tail second; or to find the chance of tail first and head second; or to find the chance of tail twice.

The foregoing examples are all extremely simple, and indeed it does not seem possible by means of the Demonstrator in its present form to solve very difficult or complicated questions. It is constructed for problems involving only three logical terms; but additional slides would give the means of representing more terms and would thereby increase the range and power of the instrument. To Stanhope belongs the honour, and it is a very high honour, of being the first (probably) to attempt the solution of logical problems by a mechanical method. There may be some difference of opinion as to how far he succeeded, but there can be none as to the ingenuity of the attempt. The contrivances of earlier logicians, more especially the circles of Euler, probably prepared the way; but Stanhope did undoubtedly take a very important step in advance when he conceived and constructed his Demonstrator. His conversion of all propositions into the form of identities, by means of the quantification of the predicate, and the principle of his mechanical method, viz., that the process of mind involved in the ordinary syllogism and that involved in the numerically definite syllogism are essentially one and the same, must be regarded as distinct contributions to logical science, and as remarkable anticipations of recent discoveries.

ROBERT HARLEY.

I append to this paper Stanhope's Table of Syllogisms, with his own observations and some others that may serve to explain it :—

STANHOPE TABLE OF SYLLOGISMS,
CONSISTING OF THIRTY-SIX FORMS.

OBSERVATION. — The word INCONCLUSIVE, as referring to this Table, means INCONCLUSIVE as BETWEEN A AND B.

	All M is B.	All B is M.	{ Some M is B ; or, Some B is M.	{ No M is B ; or, No B is M.	Some M is not B.	Some B is not M.
All M is A	1 $\frac{M}{A}$ H	2 $\frac{M}{B}$ H	3 $\frac{M}{B}$ E	19 $\frac{M}{A}$ H	20 $\frac{M}{A}$ E	21
All A is M	4 $\frac{M}{A}$ G	5	6	22 $\frac{M}{B}$ G	23	24 $\frac{M}{B}$ E
Some M is A ; or, } Some A is M . . }	7 $\frac{M}{A}$ G	8	9	25 $\frac{M}{A}$ G	26	27
No M is A ; or, } No A is M . . }	10 $\frac{M}{B}$ H	11 $\frac{M}{B}$ E	12 $\frac{M}{B}$ E	28	29	30
Some M is not A	13 $\frac{M}{B}$ G	14	15	31	32	33
Some A is not M	16	17 $\frac{N}{A}$ G	18	34	35	36

The large Figures shew the CONCLUSIVE FORMS of Syllogisms.

The small Figures shew the INCONCLUSIVE FORMS of Syllogisms.

In the first large square, { FORM No. 1, by itself ; — likewise } conclude POSITIVELY.
Nos. 4, and 7, and the corresponding
Nos. 2, and 3, }
In the second large square, { Nos. 10, 11, 12, 13, and 17, } conclude NEGATIVELY.
And also, in the third large square, { Nos. 19, 22, 25, 20, and 24, } conclude NEGATIVELY.
the corresponding }
But, in the fourth large square, all the FORMS are INCONCLUSIVE.

Logicians, since the time of Aristotle, have set down the number of possible moods or syllogisms at sixty-four. They have taken the eight propositions relating to M and A, given in the Table, and have rung the changes on these with each one of the eight relating to M and B, also given in the Table, thus making eight times eight. Or, observing that three of the four forms A, E, I, O, are necessary to constitute a syllogism, they have determined the possible moods by finding all the arrangements of the four letters taken three at a time. The number of moods thus formed is sixty-four ; but most of these are found to be invalid as contradicting one or more of the general canons of mediate inference. Stanhope, by treating as equivalent such propositions as No A is M and No M is A, and such

propositions as Some A is M and Some M is A, reduces the number of possible forms to thirty-six. Of these, six stand alone, being unaltered by the interchange of A and B; but of the remaining thirty, one-half may be derived from the other half by this simple interchange. Two syllogisms which may be converted, the one into the other, by interchanging A and B, are called by Stanhope "twins".

The Table is made after the pattern of the common multiplication table, in which the products are found at the junction of the vertical and horizontal columns. Thus in the Logical Table, the vertical column, All B is M meets the horizontal column, All M is A in the second small square, and the syllogism of which these are the premises, is indicated by 2B^M_R. In like manner the Syllogism whose premises are Some A is not M and All B is M, is indicated by 17A^N_G. The three small capitals next to the large figures are not explained by Stanhope, who merely remarks, in a letter to Mr. North, that they "are added for the use of beginners to save them trouble". The first letter M or N (N being written no doubt for shortness in place of not-M), probably indicates what the holon represents, viz.: All M or All not-M, as the case may be. The second letter, A or B, indicates the subject of the conclusion, when the conclusion is expressed in the ordinary form. Lastly, the third letter, G for gray, R for red, or H for holon, indicates "the extent of the consequence". It will further elucidate this notation if we write down all the conclusions given by the Demonstrator for the several conclusive forms, "twins" being placed side by side.

1A^M_H. Some A is B, to the extent of the holon.

2B ^M _R	All B is A, to the extent of the red.	4A ^M _G	All A is B, to the extent of the gray.
3B ^M _R	Some B is A, to the extent of the red.	7A ^M _G	Some A is B, to the extent of the gray.
10B ^M _H	Some B is not A, to the extent of the holon.	19A ^M _H	Some A is not B, to the extent of the holon.
11B ^M _R	No B is A, to the extent of the red.	22A ^M _G	No A is B, to the extent of the gray.
12B ^M _R	Some B is not A, to the extent of the red.	25A ^M _G	Some A is not B, to the extent of the gray.
13B ^M _G	Some B is not A, to the extent of the gray.	20A ^M _R	Some A is not B, to the extent of the red.
17A ^N _G	Some A is not B, to the extent of the gray.	24B ^M _R	Some B is not A, to the extent of the red.

Among valid syllogisms Stanhope also places 28, viz.:

No M is A, or No A is M.
No M is B, or No B is M.

Therefore,

Some not-A is not-B, to the extent of the holon.

But here, as already pointed out (See Example 5), there is no conclusion as between A and B, which is really all that is meant by the rule of common logic that "from two negative premises no conclusion can be drawn".

All the other forms tabulated by Stanhope are inconclusive whether as between A and B, or not-A and B, or A and not-B, or not-A and not-B, save under special conditions.

R. H.

IV.—JOHN STUART MILL (I).

I PROPOSE to review the life and character of John Stuart Mill. In addition to what all the world may know, I am aided by personal recollections extending over the second half of his life, and by documents in the possession of his family for some of the earlier portions.

My plan requires me to recall the account given in the *Autobiography* of the successive stages of his early education. There is a sort of pause or break at his eighth year, when he began Latin. His years from three to eight are occupied with Greek, English and Arithmetic; the Greek, strange to say, taking precedence. His earliest recollection of all, we are led to suppose, although not explicitly affirmed, is his committing to memory lists of Greek words written by his father on cards. He had been told that he was then three years old. Of course reading English, both printed and written, was supposed; and we have to infer that he had no recollection of that first start of all, which must have been taken before he completed his third year. Judging from the work gone through by his eighth year, he cannot be far wrong in putting down the date of the Greek commencement.

A letter from his father to Bentham, dated 25th July, 1809, affords us a momentary glimpse of him at the age of three years and two months. It was the occasion of the first visit to Bentham at Barrow Green. The letter is an apology for not being able to come on the day previously arranged, and is full of rather heavy joking about the domestic obstructions. The passage to our present purpose is this:—"When I received your letter on Monday, John, who is so desirous to be your inmate, was in the room, and observed me smiling [at Bentham's fun] as I read it. This excited his curiosity to know what it was about. I said it was Mr. Bentham asking us to go to Barrow Green. He desired to read that. I gave it to him to see what he would say, when he began, as if reading—Why have you not come to Barrow Green, and brought John with you?" The letter closes—"John asks if Monday (the day fixed) is not to-morrow". Not much is to be made of this, except that the child's precocious intellect is equal to a bit of waggyery. The remark may seem natural, that if he were then learning his Greek cards, he might actually have read the letter; but no one that ever saw Bentham's hand-writing would make that remark. As I take it, the interest of the scene lies in disclosing a sunny moment in the habitually stern relationship of the father and son.

As an introduction to the next contemporary landmark of his progress, I need to quote from himself the account of his earliest reading. He says nothing of English books till he has first given a long string of Greek authors—Æsop's Fables, the *Anabasis*, *Cyropædia* and *Memorabilia* of Xenophon, Herodotus, some of Diogenes Laertius, part of Lucian, two speeches of Isocrates; all these seem to have been gone through before his eighth year. His English reading he does not connect with his Greek, but brings up at another stage of his narrative. From 1810 to 1813 (age, four to seven) the family had their residence at Newington Green, and his father took him out in morning walks in the lanes towards Hornsey, and in those walks he gave his father an account of his reading; the books cited being now histories in English—Robertson, Hume, Gibbon, Watson's Philip the Second and Third (his greatest favourite), Hooke's History of Rome (his favourite after Watson), Rollin in English, Langhorne's Plutarch, Burnett's Own Time, the history in the Annual Register; he goes on, after a remark or two, to add Millar on the English Government, Mosheim, McCrie's Knox, a quantity of Voyages and Travels—Anson, Cook, &c.; Robinson Crusoe, Arabian Nights, Don Quixote, Miss Edgeworth's Tales, and Brooke's Fool of Quality. I repeat that all this was within the same four years as the Greek list above enumerated. At a later stage, he speaks of his fondness for writing histories; he successively composed a Roman History from Hooke, an abridgment of the Universal History, a History of Holland, and (in his eleventh and twelfth years) a History of the Roman Government. All these, he says, he destroyed. It happens, however, that a lady friend of the family copied and preserved the first of these essays, the Roman History; upon the copy is marked his age, six and a half years, which would be near the termination of the two formidable courses of reading now summarised. The sketch is very short, equal to between two and three of the present printed pages, and gives but a few scraps of the earlier traditions. If it is wonderful for the writer's age, it also shows that his enormous reading had as yet done little for him. He can make short sentences neatly enough; he gives the heads of the history, in the shape of the succession of kings and consuls and, in imitation of his author, he supplies erudite and critica notes.¹

¹ The beginning runs thus :—(heading 'First Alban Government : Roman Conquest in Italy') "We know not any part, says Dionysius of Halicarnassus, of the History of Rome till the Sicilian invasions. Before that time, the country had not been entered by any foreign invader. After the expulsion of Sicilians, Iberian (?) kings reigned for several years; but in the time of Latinus, Æneas, son of Venus and Anchises, came to Italy,

My next document is a letter, in his own hand, dated Sept. 13, 1814. He was now eight years and four months. He was in the second stage of his studies, when he had begun Latin, and had extended his reading in Greek to the poets, commencing with the *Iliad*. He was also teaching his sister, two years younger than himself. The event that gave rise to the letter was the migration of the whole family to Bentham's newly acquired residence, Ford Abbey, in Somersetshire. I will give a part and abridge the rest. His correspondent was some intimate friend of the family unknown.

"I have arrived at Ford Abbey without any accident, and am now safely settled there. We are all in good health, except that I have been ill of slight fever for several days, but am now perfectly recovered.

"It is time to give you a description of the Abbey. There is a little hall and a long cloister, which are reckoned very fine architecture, from the door, and likewise two beautiful rooms, a dining-parlour and a breakfast-parlour adorned with fine drawings within one door; on another side is a large hall, adorned with a gilt ceiling; and beyond it two other rooms, a dining and drawing room, of which the former contains various kinds of musical instruments, and the other is hung with beautiful tapestry.

"To this house there are many staircases. The first of them has little remarkable up it, but that three rooms are hung with tapestry, of which one contains a velvet bed, and is therefore called the velvet room. The looking-glass belonging to this room is decorated with nun's lace.

"Up another staircase is a large saloon, hung with admirable tapestry, as also a small library. From this saloon issues a long range of rooms, of which one is fitted up in the Chinese style, and another is hung with silk. There is a little further on a room, which, it is said, was once a nursery; though the old farmer Glyde, who lives hard by, called out his sons to hear the novelty of a child crying in the Abbey! which had not happened for the whole time he had lived here, being near thirty years. Down a staircase from here is a long range of bedrooms, generally called the Monks' Walk. From it is a staircase leading into the cloisters. The rest of the house is not worth mentioning. If I was to mention the whole it would tire you exceedingly, as this house is in reality so large that the eight rooms on one floor of the wing which we inhabit, which make not one-quarter of even that floor of the whole house, are as many as all the rooms in your house, and considerably larger.

"I have been to the parish church which is at Thornecomb. Mr. Hume has been here a great while. Mr. Koe came the other day, and Admiral

and established a kingdom there called Albania. He then succeeded Latinus in the government, and engaged in the wars of Italy. The Rutuli, a people living near the sea, and extending along the Nûmicus up to Lavinium, opposed him. However, Turnus their king was defeated and killed by Æneas. Æneas was killed soon after this. The war continued to be carried on chiefly against the Rutuli, to the time of Romulus, the first king of Rome. By him it was that Rome was built."

It was about the age when he wrote this history, that he was invited to an interview with Lady Spencer (wife of Lord Spencer, then at the head of the Admiralty); her curiosity being roused by the accounts of him. His conversation on the occasion turned chiefly on the personages of Roman history, whose characters he fluently hit off.

Chietekoff is expected. Willie and I have had rides in Mr. Hume's curricule."

He goes on to say—"What has been omitted here will be found in a journal which I am writing of this and last year's journeys". He then incontinently plunges again into descriptive particulars about the fish-ponds, the river Axe, the deer-parks, the walks, and Bentham's improvements. The performance is not a favourable specimen of his composition; the hand-writing is very scratchy, and barely shows what it became a few years later. The reference to Joseph Hume's visit has to be connected with the passage at arms between the elder Mill and Bentham, which I had formerly occasion to notice (MIND VIII., p. 525, 526).

By far the most important record of Mill's early years is his diary during part of his visit to France, in his fifteenth year; and from this I hope to illustrate with some precision the real character of his acquisitions and his intellectual power at that age. A very valuable introduction to this diary was lately brought to light by Mr. Roebuck, who had fortunately preserved a letter of Mill's that he had received from Jeremy Bentham's amanuensis in 1827. It was addressed to Bentham's brother, Sir Samuel Bentham, and it is dated July 30, 1819, his age being thirteen years and two months. The letter begins thus:—

"My Dear Sir,—It is so long since I had the pleasure of seeing you that I have almost forgotten when it was, but I believe it was in the year 1814, the first year we were at Ford Abbey. I am very much obliged to you for your enquiries with respect to my progress in my studies; and as nearly as I can remember, I will endeavour to give an account of them from that year."

He then goes on to detail his reading for the successive years from 1814. I do not print the details, but will compare them with the *Autobiography*, and indicate agreements and differences. In the year 1814 (by the letter), he read, in Greek, Thucydides and Anacreon (an odd coupling), and, *he believed*, the *Electra* of Sophocles, the *Phœnissæ* of Euripides, the *Plutus* and the *Clouds* of Aristophanes, and the *Philippics* of Demosthenes; in Latin, only the *Oration* of Cicero for Archias, and part of the pleading against Verres. In Mathematics, he was reading Euclid; he began Euler's Algebra, and worked at Bonnycastle; also some of West's Geometry. In 1815, his reading was Homer's *Odyssey*, Theocritus, some of Pindar, the *Orations* of Æschines and Demosthenes on the Crown. In Latin: first six books of Ovid's *Metamorphoses*, first five books of Livy, the *Buccolics* and the first six books of the *Æneid* of Virgil, and part of Cicero de *Oratione*. In Mathematics: finished the six books of Euclid together with the Eleventh and Twelfth, and the Geometry of West; studied

Simpson's Conic Sections, and West's Conic Sections, Numeration and Spherics; and, in Algebra, Hesse's Algebra and Newton's Universal Arithmetic, in which last he performed all the problems without the book, and most of them without any help from the book.

1816. Greek: part of Polybius, Xenophon's Hellenics, the Ajax and Philoctetes of Sophocles, the Medea of Euripides, the Frogs of Aristophanes, and great part of the Anthologia Græca. Latin: all Horace, except the Epodes. Mathematics: Stewart's Propositiones Geometricæ, Playfair's Trigonometry at the end of his Euclid, "Geometry" in the Edin. Encyclopædia, and Simpson's Algebra.

1817. Greek: Thucydides (the second time), many Orations of Demosthenes, all Aristotle's Rhetoric, of which he made a synoptical table. Latin: Lucretius, all but the last book, Cicero, Ad Atticum, Topica, and De Partitione Oratoria. Mathematics: "Conic Sections" in Encyc. Brit.; Simpson's Fluxions, Keill's Astronomy, and Robison's Mechanical Philosophy.

1818. Greek: more of Demosthenes; four first books of Aristotle's Organon, tabulated in the manner of the Rhetoric. Latin: all Tacitus (except the Dialogue on Oratory), great part of Juvenal, beginning of Quintilian. Mathematics: Emerson's Optics, Trigonometry by Prof. Wallace, solution of problems, beginning of article on Fluxions in the Edin. Encyc. Began to learn Logic, read several Latin treatises—Smith, Brewster, Du Trieu, part of Burgersdicius, Hobbes.

1819 (the year when the letter was written). Greek: Plato's Gorgias, Protagoras, and Republic. Latin: Quintilian, in course of reading. Mathematics: Fluxions, problems in Simpson's Select Exercises. Also, he is now learning Political Economy.

While this enumeration is much fuller than that in the *Autobiography*, it omits mention of several works there given: as Sallust, Terence, Dionysius, and Polybius. The private English reading is in both: chiefly Mitford's Greece, Hooke and Ferguson's Rome and the Ancient Universal History. His composing Roman History, as well as Poetry and a Tragedy, is given in both. The Higher Mathematics of this period is but slightly given in the *Autobiography*.

This letter was doubtless intended not merely to satisfy Sir Samuel's curiosity as to his precocity of acquirement, but also to pave the way for the invitation to accompany him to France the following year (1820).

A carefully written diary, extending over the first five months of his stay in France, is by far the most satisfactory record that is now to be had of his youthful studies.¹

¹ Sir Samuel Bentham, the brother of Jeremy Bentham, was himself a

We have his reading and all his other occupations recorded day by day, together with occasional reflections and discussions that attest his thinking power at that age. The diary was regularly transmitted to his father. At first he writes in English; but as one of the purposes of his visiting France was to learn the language, he soon changes to French. Printed in full it would be nearly as long as this article. I shall endeavour to select some of the more illustrative details.

He left London on the 15th May, 1820, five days before completing his fourteenth year. He travelled in company with Mr. Ensor, an Irish gentleman, a friend of his father's. The diary recounts all the incidents of the journey—the coach to Dover, the passage across, the thirty-three hours in the diligence to Paris. He goes first to a hotel, but on presenting an introduction by his father to M. Say, he is invited to the house of that distinguished political economist. The family of the Says—an eldest son, Horace Say, a daughter at home, the youngest son, Alfred, at school *en pension*, but coming home on Saturday and Sunday, and their mother—devote themselves to taking him about Paris. He gives his father an account of all the sights, but without much criticism. His moral indignation bursts forth in his account of the Palais Royal, an "immense building belonging to the profligate Duc d'Orleans, who having ruined himself with debauchery, resolved to let the arcades of his palace to various tradesmen". The Sunday after his arrival (May 21) is so hot that he did not go out, but played at battledore and shuttlecock with Alfred Say. He delivers various messages from his father and Bentham, and contracts new acquaintances, from whom he receives farther attentions. The most notable was the Count Berthollet, to whom he took a paper from Bentham. Madame Berthollet showed him her very beautiful

remarkable man. His first service was in the Russian army, where his soldiering was intermingled with suggestions for improvements of all sorts, and especially mechanical inventions, for which he had a pronounced genius. One of his proposals to the Russian government was the Panopticon prison, of which he was the originator. He came over to England in 1795, and received from our Government the appointment of Superintendent of the Dockyard at Portsmouth, where his talent for invention had scope in the improvement of the navy. He married the daughter of an early friend of his brother's, Dr. John Fordyce, a physician in London, called by Bentham, "one of the coldest of the cold Scotch"; this lady had the domestic supervision of Mill for more than a year. On retiring from the Dockyard, Sir Samuel bought an estate in the South of France for the sake of a residence there; and this led to his inviting Mill to reside with him, first at Toulouse, and afterwards at Montpellier. The family consisted of one son, Mr. George Bentham, the well-known botanist, and three daughters,—all older than Mill.

garden, and desired him to call on his return; he learnt afterwards that he was to meet Laplace. On the 27th, after nine days' stay in Paris, he bids goodbye to Mr. Ensor and the Says, and proceeds on his way to join the Bentham family, then at a chateau, belonging to the Marquis de Pompignan, a few miles from Toulouse. The journey occupies four days, and is not without incidents. He makes a blunder in choosing the cabriolet of the diligence, and finds himself in low company. At Orleans, a butcher, with the largest belly he had ever seen, came in and kept incessantly smoking. On the third day he is at Limoges, and breakfasts in company with a good-natured gentleman from the interior; but his own company does not much improve; the butcher leaves, but a very dirty *fille*, with an eruption in her face, keeps up his annoyance. The following day, a vacancy occurs in the interior, and he claims it as the passenger of longest standing; a lady contests it with him, and it has to be referred to the *maire*; the retiring passenger, a young *avocat*, pleading his case. He is now in good company, and his account of the successive localities is minute and cheerful.

He arrives at his destination at two, A.M., the 2nd of June, is received by Mr. George Bentham, and meets the family at breakfast. They take him out a walk, and he does no work that day, but begins a letter to his father. Next day he makes an excursion to Toulouse, spends the night there, and gives up a second day to sight-seeing; there was a great religious procession that day. He makes the acquaintance of a Dr. Russell, resident at Toulouse, with whose family he afterwards associates. The following day, the 5th, he sees the Marquis and Madame de Pompignan, the proprietors of the Chateau. On the 6th, he commences work; and now begins our information as to his mode of allocating his time to study. The entry for this day merely sets forth that he got up early; went into the Library; read some of Lucian (who is his chief Greek reading for the weeks to follow); also some of Millot, by Mr. George's advice; "learnt a French fable by rote"—the beginning of his practice in French. 7th. "Learnt a very long fable; wrote over again, with many improvements, my Dialogue, part I." This Dialogue frequently comes up, but without farther explanation. We must take it as one of his exercises in original composition, perhaps in imitation of the Platonic Dialogues. 8th. Engaged with Mr. G. in arranging the books of the Library, which seems to have been set as a task to the boys. "Wrote some of Dialogue; learnt a very long fable by heart; resolved some problems of West (Algebra); did French exercises (translating and so forth)." 9th. "Breakfasted early and went with Sir S. and Lady Bentham in the carriage to Montauban; took a volume of Racine in my pocket, and

read two plays ;" remark his reading *pace*. On returning home he reads a comedy of Voltaire. 10th. "Before breakfast, learnt another fable, and read some of Virgil. After breakfast, wrote some of my Dialogue, and some French exercises. Wrought some of the Differential Calculus. Read a tragedy of Corneille." 11th. "Learnt another fable ; finished my Dialogue. If good for nothing beside, it is good as an exercise to my reasoning powers, as well as to my invention, both which it has tried extremely." We may be sure that it aimed at something very high. "Wrote some French exercises ; began to learn an extremely long fable. Read a comedy of Molière, and after dinner a tragedy of Voltaire. Took a short walk by myself out of the pleasure grounds." 12th. "Rose very early. Sir S. B. and Mr. G. went in the carriage to Toulouse. Before breakfast, I wrote some French exercises, read some of Lucian's *Hermotimus*. Revised part of my Dialogue. After breakfast went with the *domestique* Piertot to see his Metairie and his little piece of land and help him to gather cherries. After returning I finished the long fable." Then follows an apology for not working at his Mathematics ; Sir Samuel's books are not unpacked, and in the Library of the house he finds chiefly French literature, and hence his readings in Racine, &c. Another tragedy read to-day. 13th. Before breakfast assists Mr. G. in packing. Wrote French exercises, read Voltaire and Molière. It is by the advice of the family that he reads plays, for the sake of dialogue. After dinner, he takes a long walk on the hills behind Pom-pignan ; in his return falls in with the *garde champêtre*, who communicates all about himself and his district. Weather now hot. 14th. Could not get into the Library. Walked about the grounds with Mr. G. and one of his sisters ; came in and wrote French exercises. Begins a new study,—to master the Departments of France. Reads Lucian. 15th. Got up early ; began his *Livre Statistique* of the Departments—chief towns, rivers, population, &c. Learns by heart the names of the Departments and their capital towns. Acting on a suggestion of Lady B., he reads and takes notes of some parts of the Code Napoleon. Meets the Russell family at dinner, and walks with them. 16th. Up early, walked out, reads a tragedy of Voltaire. A mad dog has bitten several persons. More of Code Napoleon ; Virgil ; French exercises. Here he concludes what is to make his first letter to his father, and appends to the diary a dissertation on the state of French Politics ; the then exciting topic being the Law of Elections. We are surprised at the quantity of information he has already got together, partly we may suppose from conversations, and partly from newspapers ; but he never once mentions reading a newspaper ; and his opportunities of conver-

sation are very much restricted by incessant studies. Besides passing politics, illustrated by anecdotes, he has inquired into education, the statistics of population, and the details of the provincial government.

I continue the extracts from the Diary. June 17th. Late in bed, not knowing the time. One of Sir Samuel's daughters has given him Legendre's Geometry, to which he applies himself, at first, for the sake of French Mathematical terms. Performs an investigation in the Differential Calculus. A short walk. After dinner, a tragedy of Corneille. 18th. Rose early. Wrote French exercises, and read Voltaire. It is a fête day (Sunday), and the peasants danced in the pleasure grounds before the house. After breakfast, finished exercises, then walked with the family in the grounds. Received from Mr. G. a lecture on Botany (probably the beginning of what became his favourite recreation). Wrote out the account of his expenditure since leaving Paris, gives the items, amounting to 148 francs. Describes the peasants' dance. 19th. Rose early. Finished the *Hermotimus* of Lucian, and yesterday's tragedy; wrote French exercises. After breakfast, assisted in packing up, as the family are leaving the chateau for a residence in Toulouse. Finds time before dinner for another tragedy of Voltaire. In the evening, took to an article in the *Annales de Chimie* (his interest in Chemistry being now of four years' standing). 20th. Occupied principally with preparations for leaving. 21st. The house in confusion. Still he does a good stroke of French reading. 22nd. In bed till after nine; could not account for it. The confusion is worse confounded; doesn't know what to do about his books; is now debarred from the library. Has taken out his exercise-book from his trunk, and written a considerable portion of exercises. Has added to his *Livre Statistique*; the Departments are now fully in his head: next topic the course of the Rivers—an occupation when he has nothing else to do. 23rd. Rose at 3 o'clock, to finish packing for departure. As there could be no reading, at 5 he takes a long country walk to Fronton; gives two pages of the diary to a description of the country, and the agriculture. Books being all locked up, he expects to feel ennui for a little time. Writes some of his *Livre*, converses with two intelligent workmen, gives particulars. After dinner, walks to the village of ——— on the Garonne, describes the river itself in the neighbourhood. In the evening, being the "Veille de St. Jean," saw the fires lighted up in the district. 24th. Lay in bed purposely late, having nothing to do. M. Le Comte (son of the proprietor) comes in, and politely offers him the key of the library, shows him a book of prints; he also scores a tragedy of Voltaire. As this is the last day before moving to Toulouse, he

makes a pause, and despatches his seven days' diary to his father, accompanied with a short letter in French to R. Doane, Bentham's amanuensis, chiefly personal and gossip; none of his letters to Mr. Doane take up matters of thought. 25th. Rose at half-past two for the journey. He walks out on foot, to be overtaken by a char-à-banc, with part of the family. One of the girls drove part of the way, and gave him the reins for the remainder, as a lesson in driving. They take up their quarters in one of the streets, where they have a very good 'Apartment' (I suppose a flat); still after the chateau, they feel considerably cramped; his room a little hole, which he proceeds at once to arrange, having got shelves for his books. Same night, finishes Lucian's *Βίον Πρᾶσις*, and reads some of Thomson's Chemistry, which is part of his own library.

The family remains in Toulouse for some time. We have his diary for nearly six weeks. It is the intention of the Benthams to find him, not merely a French master, but instruction in various accomplishments—music, dancing, fencing, horsemanship. It is some time before the arrangements are made, so that his first days are purely devoted to book-studies; and the diary is an exact record of the nature, amount, and duration of his reading, very nearly as at home. It also gives occasional glimpses of his thinking power at the age he has now reached. It is farther interesting as exhibiting his tone towards his father. I will merely quote enough to complete the illustration of these various particulars.

26th. Besides a mass of French reading, reports two eclogues of Virgil and the Alectryon of Lucian. Remarks that having so much French to do, he cannot read Latin and Greek and study Mathematics every day, and means to give one day to Mathematics and one to Latin and Greek. 27th. Rose early. Begins the practice of going every morning to bathe in the Garonne, a little above the town: he is accompanied regularly by Mr. George, and on this occasion by Dr. Russell's boys. To-day reads Legendre's Geometry. Gives a subtle criticism of the author's method, which he thinks excellent; praises the derivation of the Axioms from the Definitions, as conforming to Hobbes's doctrine that the science is founded on Definitions. Approves also of the way the more elementary theorems are deduced. Learnt a very long French fable. Solved a problem in West's Algebra that had baffled him for several years. Mr. George has already engaged for him the best dancing-master in the place. 28th. (Classical day.) Bathing as usual. Two eclogues of Virgil, and a French grammatical treatise on Pronouns. Read some more of Legendre (resolution broken through already): thinks his line of deduction better than Euclid, or even than

West. Studies Bentham's Chrestomathic Tables (a vast and minute scheme of the divisions of knowledge). Began the Vocalium Judicium of Lucian. Goes for a second dancing-lesson. 29th. Rather late in returning from the river. An eclogue of Virgil; finishes the Vocalium Judicium; wrote French exercises, read some of Boileau's little pieces; is to have Voltaire's works soon; asks Mr. George about a Praxis in the higher Mathematics, having performed over and over again all the problems in Lacroix's Differential Calculus. Resolves more problems of West, including the second of two that had long puzzled him. After dinner began Lucian's Cataplus. 30th. Two eclogues of Virgil; finished Cataplus; more of Legendre, discovered a flaw in one of his demonstrations; wrote French exercises; read some of Sanderson's Logic; also some of Thomson's Chemistry. July 1st. Treatise on Pronouns finished; Sanderson; began Lucian's Necyomantia; French exercises; finished first book of Legendre; Thomson's Chemistry. Dancing-lesson. A singing-master engaged. 2nd. Georgics of Virgil, 99 lines; more of the Necyomantia before breakfast. After breakfast, Thomson's Chemistry. Wrote Livre Geographique. In the evening the whole family go to Franconi's Circus; describes the exploits. Has to be measured for a new suit, French fashion: his English suit being inadmissible, trousers too short, waistcoat too long. The Russells call in the evening, and there is an earnest talk on politics, English and French, which he details. 3rd. A breakdown in the char-à-banc that takes them to the river. Has now got a singing-master, and takes first lesson in *Solféges et Principes de Musique*. Again at Franconi's, and full of the performance; for a wonder, no studies recorded. 4th. Rose at 5; home from bathing, &c., at 7½. Has obtained Voltaire's *Essai sur les Mœurs*, which he includes amongst his stated reading: breakfast at ¼ to 9: at 9½, begins Voltaire where he left off in England, read six chapters in two hours; Virgil's Georgics, 47 lines; at 12¼ began a treatise on French Adverbs; at 1½, began the second book of Legendre, read the definitions and five propositions; miscellaneous employments till 3, then took second Music-lesson. Dined; family again to Franconi's, but he could not give up his dancing-lesson; this got, he writes French exercises and practises music. 5th. Rose at 5; too rainy for bathing. Five chapters of Voltaire; from 7½ till 8½, Mr. G. corrects his French exercises which had got into arrears as regards correction; Music-master came; at 9½ began new exercises (French); puts his room in order; at 11¼ took out Lucian and finished Necyomantia; five propositions of Legendre, renewed expressions of his superiority to all other geometers; practised Music-lessons; Thomson's Chemistry,

made out various Chemical Tables, the drift not explained ; at 3½, tried several propositions in West, and made out two that he had formerly failed in ; began a table of 58 rivers in France, to show what departments each passes through, and the chief towns on their banks ; 4, dined ; finishes Chemical Table ; dancing-lesson ; supped. Reports that a distinguished music-mistress is engaged at whose house he is to have instrumental practice. 6th. Rose at 6 ; no bathing ; five chapters of Voltaire ; a quarter of an hour to West's Problems ; lesson in Music (*Principes*) ; problems resumed ; breakfasted, and tried problem again till 10½ ; French exercises till 11 ; began to correct his Dialogue, formerly mentioned, till 12½ ; summoned to dress for going out to call ; has found a French master ; at 1½, returned and corrected Dialogue till 3½ ; Thomson till 4 (dinner), resumed till 6 ; Mr. G. corrects his French exercises ; went out for his French lesson, but the master did not teach on Sundays and Thursdays ; back to Thomson till 8 ; repeated Fables to Mr. G. ; miscellaneous affairs ; supped ; journal always written just before going to bed. 7th. Rose 5½ ; five chapters Voltaire till 7 ; till 7½, 46 lines of Virgil ; till 8, Lucian's Jupiter Con-futatus ; goes on a family errand ; Music-lesson till 9 (*Principes*) ; Lucian continued till 9½, and finished after breakfast at 10½ ; a call required him to dress ; read Thomson and made Tables till 12½ ; seven propositions of Legendre ; has him over the coals for his confusion in regard to ratio—"takes away a good deal of my opinion of the merit of the work as an elementary work" : till 1½, wrote exercises and various miscellanies ; till 2½ the treatise on Adverbs ; till 3¾, Thomson ; Livre Geographique and miscellanies till 5 ; eats a little, dinner being uncertain, owing to a family event ; goes for first lesson to music-mistress, a lady reduced by the Revolution, and living by her musical talents ; henceforth to practise at her house daily from 11 to 12, and take a lesson in the evening ; dined on return, then dancing-lesson. 9th. Rose at 5 ; five chapters Voltaire ; 6½, Adverbs ; 7¾, the Prometheus of Lucian ; 8½ till 9, first lesson of *Solféges* together with *Principes* ; continued Prometheus till breakfast ; miscellaneous occupation till the hour of music-lesson at Mad. Boulet's ; home at 12½, ten propositions of Legendre : "if anything could palliate the fault I have noticed of introducing the ratio and the measures of angles before the right place, it is the facility which this method gives to the demonstration of the subsequent propositions ; this, however, cannot excuse such a palpable logical error, &c." Mr. G. is to procure Cagnoli's Trigonometry, but a Praxis in the higher Mathematics is not yet forthcoming. 10th. Starts at 4 with Mr. G. and the Russells on a day's excursion to the forest of

Bouconne, three leagues from Toulouse, the object being to collect plants and insects. Makes his *coup d'essai* at catching butterflies, got only about ten worth keeping; the adventures of the day fully given. 11th. Yesterday's fatigue keeps him in bed late; one chapter of Voltaire; at 7½, with Mr. G., to begin with his French master, who hears his pronounciation, and sets him plenty of work. Taken with a party to the house of an astronomer, M. Daubuisson, and shown his instruments; then to the house of his brother, a great mineralogist. Returns at 2 to commence the formidable course of lessons set by the French master. Goes successively to his music-master and music-mistress. Introduces a remark as to the great kindness of the family in constantly, without ill-humour, explaining to him the defects in his way of conducting himself in society: "I ought to be very thankful". 12th. Hears from his father that Lady B. has written a good account of him. Replies in full to the matters in his father's letter; is glad to hear of his article on Government and promises on his return to read it with great attention. Indicates that in future his French lessons will very much engross his time. He is to take the first opportunity of sending the Dialogue, on which he has taken great pains both with expression and with reasoning. Apologises for giving more time to Mathematics than to Latin and Greek.

A fencing-master is now provided for him, and in two days more a riding-master, so that we have seen him at his best as regards book-studies. He keeps these up a few hours every day, but the largest part of the day is taken up with his other exercises. The only thing deserving mention now is the occasional notice of new subjects. Thus, he begins a treatise on Value, and Sir S. B. is to get Say's book for him. His French master seems to prescribe, among other things, translating from Latin into French, and he takes up the speech of Catiline in Sallust, and afterwards some Odes of Horace. There is another day's excursion to the forest of Ramelle, with many incidents. He soon reports having read the last of Lucian, and gives a short review of him, accompanied with high admiration; Her-motimus he considers a masterpiece of ingenious reasoning. In a letter to his mother he adverts to his progress in music and dancing; he advises his two elder sisters to remit their music till he returns, as he discovers now that they were on a wrong plan. Writes a letter in Latin to those two sisters, correct enough but not very high composition. Begins a Dialogue at the suggestion of Lady B., on the question—whether great landed estates and great establishments in commerce or manufacturers, or small ones, are most conducive to the general

happiness; in the circumstances, rather venturesome. The following day began, also by Lady B's advice, to write on the Definition of Political Economy. Very much elated by "excellent news of the revolution in Italy". Attends three Lectures on Modern Greek, and gives his father an account of the departures from the Ancient Greek. In the beginning of August the lessons are at an end; the family going for a tour in the Pyrenees. What remains of the diary is occupied with this tour, its incidents and descriptions, and is written in French.

I must, however, advert to an interesting letter from Lady Bentham to his father, dated 14th Sept. It refers to a previous letter of hers giving particulars of John's progress in French and other branches of acquirement. The family is to reside in Montpellier, and the purpose of the present letter is to recommend to his father to allow him to spend the winter there, and to attend the public lectures of the college. Mr. Bernard, a distinguished chemist, who had visited the Benthams at Toulouse, had taken an interest in him, and sounded his depths and deficiencies, and gives the same opinion. As the party has now been boxed up together for some weeks, his habits and peculiarities had been more closely attended to than ever, and (I quote the words) "we have been considerably successful in getting the better of his inactivity of mind and body when left to himself". This probably refers to his ennui when deprived of books; it being apparent that great as was his interest in scenery, he could not as yet subsist upon that alone. The letter goes on—"Upon all occasions his gentleness under reproof and thankfulness for correction are remarkable; and as it is by reason supported by examples we point out to him that we endeavour to convince him—not by command that we induce him to do so and so, we trust that you will have satisfaction from that part of his education we are giving him to fit him for commerce with the world at large". Lady Bentham does not omit to add that he must also dress well.

The remainder of the diary serves mainly to show his growing taste for scenery and his powers of description. He depicts climate, productions, villages, the habits of the people, as well as the views that were encountered. The party make the ascent of Le Pic du Midi de Bigorre, and he is in raptures with the prospect. "Mais jamais je n'oublierai la vue du côté méridionale". In short, to describe its magnificence would need a volume!

We may now conceive with some degree of precision the intellectual calibre of this marvellous boy. In the first place we learn the number of hours that he could devote to study each

day. From two to three hours before breakfast, about five hours between breakfast and dinner, and two or three in the evening, make up a working day of nine hours clear. And while at Toulouse, scarcely any portion of his reading could be called recreative. His lightest literature was in French, and was intended as practice in the language. Probably at home his reading-day may have often been longer; it would scarcely ever be shorter. For a scholar, in mature years, eight or nine hours' reading would not be extraordinary; but then there is no longer the same tasking of the memory. Mill's power of application all through his early years was without doubt amazing; and although he suffered from it in premature ill-health, it was a foretaste of what he could do throughout his whole life. It attested a combination of cerebral activity and constitutional vigour that is as rare as genius; his younger brothers succumbed under a far less severe discipline.

That the application was excessive, I for one would affirm without any hesitation. That his health suffered, we have ample evidence, which I shall afterwards produce. That his mental progress might have been as great with a smaller strain on his powers, I am strongly inclined to believe, although the proof is not so easy. We must look a little closer at the facts.

I cannot help thinking that the rapid and unbroken transitions from one study to another must have been unfavourable to a due impression on the memory. He lost not a moment in passing from subject to subject in his reading: he hurried home from his music-lesson, or fencing-lesson, to his books. Now we know well enough that the nervous currents when strongly aroused in any direction tend to persist for some time: in the case of learning any thing, this persistence will count in stamping the impression; and part of the effect of a lesson must be lost in hurrying without a moment's break to something new, even although the change of subject is of the nature of relief. By his own account, his lessons at Toulouse, with the exception of French and music, took no effect upon him. Nor is this the worst feature of Mill's programme. According to our present notions of physical and mental training, he ought to have had a decided break in the afternoon. Considering that he was at work from about six in the morning, with only half-an-hour for breakfast, he should clearly have had a cessation of several hours, extending over dinner between one and two; especially as he gave up the evening to his hardest subjects. Of course this interval should have been devoted to out-of-doors recreation. It is quite true that both father and son were alive to the necessity of walking, and practised it even to excess; in fact, counted too much upon it as a means of renewing the forces of the brain:

their walks were merely a part of their working-day—a hearing and giving of lessons.

What with his own recital in the *Autobiography*, and the minuter details in the letter to Sir S. Bentham, and the diary, we have a complete account of his reading and study in every form. The amount is, of course, stupendous for a child. The choice and the sequence of books and subjects suggest various reflections. His beginning Greek at so early an age was no doubt due to his father's strong predilection for the language. What we wonder at most is the order of his reading. Before his eighth year, he had read not merely the easier writers, but six dialogues of Plato (the *Theætetus* he admits he did not understand). He was only eight when he first read Thucydides, as well as a number of plays; at nine, he read parts of Demosthenes; at eleven, he read Thucydides the second time. What his reading of Thucydides could be at eight, we may dimly imagine: it could be nothing but an exercise in the Greek language; and the same remark must be applicable to the great mass of his early reading both in Greek and in Latin. At Toulouse we find him still reading Virgil, although five years before he had read the *Buccolics* and six books of the *Æneid*. Moreover, at Toulouse, his Greek reading was Lucian, a very easy writer whom he had begun before he was eight; the noticeable fact being that he is now taking an interest in the writer's thoughts and able to criticise him. It is apparent enough that his vast early reading was too rapid, and as a consequence superficial. It is noticeable how rare is his avowal of interest in the subjects of the classical books; Lucian is an exception; Quintilian is another. He was set by his father to make an analysis of Aristotle's *Rhetoric* and *Organon*, and doubtless his mind was cast for Logic from the first. His inaptitude for the matter of the Greek and Latin poets is unambiguously shown; he read Homer in Greek, but his interest was awakened only by Pope's translation. His readings in the English poets for the most part made no impression upon him whatever. He had a boyish delight in action, battles, heroism and energy; and seeing that whatever he felt, he felt intensely, his devotion to that kind of literature was very ardent. But whether from early habits, or from native peculiarity, he had all his life an extraordinary power of re-reading books. His first reading merely skimmed the subject; if a book pleased him, and he wished to study it, he read it two or three times, not after an interval, but immediately. I cannot but think that in this practice there is a waste of power.

It was impossible for his father to test the adequacy of his study of Greek and Latin works, except in select cases; and hence it must have been very slovenly. In Mathematics, he

had little or no assistance, but in it there are self-acting tests. His readings in Physical Science were also untutored: unless at Montpellier, he never had any masters, and his knowledge never came to maturity.

If I were to compare him in his fifteenth year with the most intellectual youth that I have ever known, or heard or read about, I should say that his attainments on the whole are not unparalleled, although, I admit, very rare. His classical knowledge, such as it was, could easily be forced upon a clever youth at that age. The Mathematics could not be so easily commanded. The best mathematicians have seldom been capable of beginning Euclid at eight or nine,¹ and even granting that in this, as in other subjects, he made small way at first, yet the Toulouse diary shows us what he could do at fourteen; and I should be curious to know whether Herschel, De Morgan, or Airy could have done as much. I have little doubt that, with forcing, these men would all have equalled him in his Classics and Mathematics combined. The one thing, in my judgment, where Mill was most markedly in advance of his years, was Logic. It was not merely that he had read treatises on the Formal Logic, as well as Hobbes's *Computatio sive Logica*, but that he was able to chop Logic with his father in regard to the foundations and demonstrations of Geometry. I have never known a similar case of precocity. We must remember, however, that while his father pretended to teach him everything, yet, in point of fact, there were a few things that he could and did teach effectually: one of these was Logic; the others were Political Economy, Historical Philosophy and Politics, all which were eminently his own subjects. On these John was a truly precocious youth; his innate aptitudes, which must have been great, received the utmost stimulation that it was possible to apply. His father put enormous stress upon Logic, even in the scholastic garb; but he was himself far more of a logician than the writers of any of the manuals. In that war against vague, ambiguous, flimsy, unanalysed words and phrases, carried on alike by Bentham and by himself, in the wide domains of Politics and Ethics, he put forth a faculty not imparted by the scholastic Logic; and in this higher training the son was early and persistently indoctrinated. To this was added other parts of logical discipline that may also be called unwritten: as, for example, the weighing and balancing of arguments *pro* and *con* in every question; the looking out for snares and fallacies of a much wider compass than those set down in the common

¹ Locke knew a young gentleman who could demonstrate several propositions in Euclid before he was thirteen.

manuals. (See the beginning of the 'Bentham' article for Mill's delineation of Bentham's Logic.)

He returned to England in July, 1821, after a stay of fourteen months. He sufficiently describes the fruits of his stay in France, which included a familiar knowledge of the French language, and acquaintance with ordinary French literature. If we may judge from what he says afterwards, his acquaintance with the literature was strictly *ordinary*; he knew nothing of the French Revolution, and it was at a much later period that he studied French authors for the improvement of his style.

He had still nearly two years before entering on official life: and he tells us how these were occupied. His father had become acquainted with John Austin, who assisted him in Roman Law, his destination being the bar. He also got deep into Bentham for the first time, and began Psychology. He now read the history of the French Revolution. An undated letter to his father probably belongs to this period. He was on a visit to Mr. and Mrs Austin at Norwich. The letter begins with a short account of his studies. He read Blackstone (with Mr. Austin) three or four hours daily, and a portion of Bentham's "Introduction" (I suppose the *Morals and Legislation*) in the evening. Among other things, "I have found time to write the defence of Pericles in answer to the accusation which you have with you. I have also found some time to practise the delivery of the accusation, according to your directions." Then follows an account of a visit of ten days with the Austins to the town of Yarmouth, with a description of the place itself. The larger part of the letter is on the politics of Norwich, where "the Cause" (Liberal) prospers ill, being still worse at Yarmouth. He has seen of Radicals many; of clear-headed men not one. The best is Sir Thomas Beever, whom he wishes to be induced to come to London and see his father and Mr. Grote. At Yarmouth he has dined with Radical Palmer, who had opened the borough to the Whigs; not much better than a mere radical. "I have been much entertained by a sermon of Mr. Madge, admirable as against Calvinists and Catholics, but the weakness of which as against anybody else, I think he himself must have felt." The concluding paragraph of the letter should have been a postscript—

"I wish I had nothing else to tell you, but I must inform you that I have lost my watch. It was lost while I was out of doors, but it is impossible that it should have been stolen from my pocket. It must therefore be my own fault. The loss itself (though I am conscious that I must remain without a watch till I can buy one for myself) is to me not great—much less so than my carelessness deserves. It must however vex you—and deservedly, from the bad sign which it affords of me."

On his return from France, he resumed energetically the task of home-teaching, making a great improvement in the lot of his pupils, who were exclusively under their father's care in the interval; for while he scolded them freely for their stupidity and backwardness, he took pains to explain their lessons which their father never did. He was kept at this work ever after. I remember on one occasion hearing from Mrs. Grote that she had turned up an old letter from James Mill, in answer to an invitation to John to accompany Mr. Grote and her on a vacation-tour; the reply was that he could not be spared from the work of teaching the younger children.

The *Autobiography* gives a full account of his acquaintances among the young men resident at Cambridge, who afterwards came to London, including, besides Charles Austin, who was the means of introducing him, Macaulay, Hyde and Charles Villiers, Strutt (Lord Belper), Romilly, &c. There is no mention of his having gone to Cambridge in 1822, on a visit to Charles Austin. The contrast of his boyish figure and thin voice with his immense conversational power left a deep impression on the undergraduates of the time; notwithstanding their being familiar with Macaulay and Austin.

I alluded, in my last article on James Mill, to the persistent attempts of Professor Townshend of Cambridge to get John entered there. Here are two sentences from a letter dated March 29, 1823, two months before he entered the India House. "I again entreat you to permit me to write to the tutor at Trinity to enter your son's name at that noble college. Whatever you may wish his eventual destiny to be, his prosperity in life cannot be retarded, but must on the contrary be increased by making an acquaintance at an English University with his Patrician contemporaries." Whether it would have been possible to induce his father to send him to Cambridge, I very much doubt. I suspect that, of the two, the son would have been the more intractable on the matter of subscription to the Articles. Ten years later, it was an open question in the house whether his brother Henry should be sent to Cambridge.

A. BAIN.

(To be continued.)

V.—DEFINITION *DE JURE* AND *DE FACTO*.

THE extent to which the custom prevails of using simple, wide, unqualified names for classes which are less simple and narrower, is one of those facts which are granted so easily in theory that in practice they are often forgotten. It is of course closely bound up with our habit of using incomplete, in place of complete, definition: it proceeds from the same causes and is apt to lead to much the same results. Sometimes through ignorance that narrower classes exist, sometimes through carelessness, sometimes through a real need for saving time, givers and users of names are commonly content if the names are sufficient to connote only a part—generally the most superficial and striking part—of the group of attributes actually belonging, or afterwards supposed to belong, to the class named.

But whatever may be urged in favour of the custom on the ground of economy of time and trouble, the risk encountered—the price paid for convenience—is worth considering. The risk is a double one: first, ambiguity may arise, and secondly the remedy applied may be almost worse than the evil. When a class to which a name is already appropriated is discovered (or remembered) to possess more numerous attributes than are strictly implied in the name—no less than when its real attributes are found to be incompatible with its nominal ones—a troublesome contradiction results: the class that strictly corresponds to the name is seen to include members which in popular usage are (sometimes expressly) excluded. Things which are clearly not-A are seen to be as clearly A.

Familiarity with the danger seems to have bred contempt for it. Some writers, no doubt, outwardly deplore the fact, but they do not seem impelled to find a remedy. Some of the less scientific are content to throw the blame on Logic and to leave it there: others (*e.g.*, Sir Wm. Hamilton) whose profession prevents this escape, at least in its outspoken form, satisfy themselves by simply calling the contradiction hopeless: but very many take one side or the other in controversies where it occurs, with as much serious conviction as if the terms employed were not at all ambiguous.

We are seldom distinctly put on our guard against it. Even Whately, who has neglected the subject of Fallacies less than most writers, is content to dispose of this kind of ambiguity in one short paragraph. Instances of ambiguity, to be noticed and remembered as such, must be obvious and striking, and although the transparency of double meanings has undergone much increase since Aristotle's time, many that were thought by

him worth mentioning being now incapable of seriously puzzling a child, yet this particular class of them has hardly yet emerged sufficiently into recognition to have received the express notice it deserves. In its finer shades it is too subtle to have attracted much attention from those whose interest, or the interest of whose audience, in the subject, is of the usual half-playful kind.

Just in proportion to its subtlety is, of course, its harmful influence on thought. I think it could be shown that many of the intricate questions which are still often called 'open,' really owe their vitality to its presence: but, however this may be, the fact that the ambiguity can possibly exist at all is sufficient justification for a survey of the means by which, in these cases, definiteness may be attained.

The term, then, having two meanings, one of them must be given up. To achieve definition, it is necessary to choose between two courses: we may either (1) sacrifice the strict connotation-meaning to that prescriptively acquired through the denotation, and keep the name in question for the objects which it has been used to denote, refusing it (at least in its unqualified shape) to the wider class; or (2) we may sacrifice denotation to connotation, and qualify the name in its application to the narrower class. The only third alternative is to invent a new *set* of names, but this may in most cases be disregarded, owing to the practical difficulty of introducing so complete a change.¹

The practical difficulty applies, though in a less degree, to the two courses first mentioned, and the large amount of this kind of ambiguity that does exist in language perhaps shows that the world on the whole prefers the less immediately troublesome plan of letting the wheat and tares grow together, and fight the battle out between themselves. Yet numerous examples can be found of attempts to employ each of the two methods: we shall see that, where they have been rivals, sometimes one sometimes the other has triumphed—in the sense, that is, of winning fairly wide acceptance; and that, as to their success in removing ambiguity, the second though complete is to some extent impracticable, while the first is never more than a temporary

¹ The artificial system of naming in Botany (*e.g.*), which has been growing in strength and completeness ever since the time of Linnæus, may appear, although aimed at prevention rather than cure of ambiguity, to point to a possibility of even complete regeneration. But it is very doubtful whether this method could ever meet with acceptance in any department of knowledge which is not given over to specialists. It has been tried on the wide scale many times in the past, and has always died a natural death. Witness the labour thrown away on the ingenious system of Bishop Wilkins, or on those of some of the numerous inventors mentioned in De Morgan's *Budget of Paradoxes*.

relief, often no real relief at all, and always liable to establish an evil that may be regarded as worse than ambiguity itself.

The field of Ethics probably supplies the most frequent instances of distinct and firm refusal to employ a term which has been used for one class, in joining to that class another formerly excluded. And one obvious reason for this is no doubt the fear, which everyone must have sometimes felt, that the classing together, even for any purpose, two kinds of acts one of which is 'right' and the other 'wrong,' may have a tendency to obscure the distinction between right and wrong themselves. Even J. S. Mill, for example, who cannot on the whole be accused of a sentimental shrinking from truth on account of its possible immoral consequences, distinctly refuses, as many people before and since have done, to class together all voluntary acts under the name of 'interested': but since voluntariness implies choice, and choice implies belief (conscious or unconscious, mistaken or not) of total preferability *for the chooser*, there can be no doubt that in every voluntary act the agent follows (in many cases, however, unconsciously) his own apparent interest. If anyone demur to this, it can only be to the use of the expression 'apparent interest' for *unconscious* self-seeking, and just here lies the root of the matter:—judging by connotation 'apparent interest' is *simply* that course which appears preferable to the chooser (including both the cases where he is, and where he is not, conscious of the preferability); but since it is only lately that attention has been much directed to the instinctive and unconscious side of our nature, the possibility of acts 'appearing preferable' to anyone without his being distinctly aware of the fact and reflecting on it, has not obtained recognition in our language: we have improvidently applied the name which by its connotation should belong to the larger class (the conscious and unconscious belief together), to that smaller portion with which we were first acquainted, and now the term has won a prescriptive right to denote that portion only. Hence, many careful writers will not allow us to name the larger class at all: in spite of all modern theories as to the connexion between instinct and reason, a hard and fast line is to be drawn at deliberate recognition, and nothing 'appears' to anyone except what he reflectively knows to appear.

Here may be seen a case where the two rival methods for avoiding ambiguity have each found their adherents, producing the two hostile camps in a well-known controversy, and where the result of employing the first method consistently would be—as it must always be—to close the path against new discoveries. It may be noticed that here, as in all those sciences in which

(probably owing to their complication and uncertainty) 'common-sense' is popularly preferred as a practical guide, the attempts to employ the second method have for the most part met with slight success, and the new nomenclature has been the property of a clique rather than universally accepted. The immense difficulty of changing purposely the denotation of any term in popular use without plainly and popularly showing some practical object to be gained (other than the mere improvement of language), is a perpetual hindrance to its application. Another hindrance is the absence of any widespread recognition of the world's continual mistakes in classification and naming.

Accordingly, for examples of the successful employment of this method, we must look, not to Ethics, but to those sciences which have fairly succeeded in establishing their popular reputation for practical value, and in which also there is less possibility of a too flattering opinion of our own attainments; for where we distinctly feel our ignorance of facts, we are more content to leave classification and naming in the hands of those who have made the facts their study. When such names as 'planet,' or 'salt,' or 'acid' (to use stock examples), come before us, there is a tendency to rely, for their strict interpretation, on the definitions agreed upon by men of science.

The history of the term 'planet' will to some extent serve as an example of the application of the second method. Before the time of Copernicus the earth was of course excluded from the class of 'planets': whatever may have been the complete list of the properties actually supposed to belong in common to the members of the ancient class, the name (as usual) gave very little information about them, the property of 'wandering' being the only one expressly connoted.¹ When, therefore, owing to the new explanation of the facts observed, the value of the old classification was overthrown, and it was thought that a more useful distinction would be that between fixed stars and moving ones, the denotation-meaning of 'planet,' which excluded the earth, was forced to give way to the connotation-meaning (or rather to the only surviving shadow of it), and the new class was called by the name which the old class had formerly possessed.

The terms 'salt,' oil,' 'acid,' and 'alkali,' often quoted as instances of *change* of meaning, may be viewed rather as cases

¹ It is probable that those who gave the name intended something more than merely change of place; the apparent irregularity of the movement was, no doubt, the striking circumstance, and the intended distinction that between such bodies as moved erratically and such as did not. This fine shade of difference, however, between 'wandering' and 'travelling,' appears to have been lost sight of in later times.

where, although there has been some change, the original meaning has been more closely adhered to than has the actual class of things meant. For in all these cases the denotation-meaning has had to give way, and the class to take in new members formerly excluded, on the discovery of the possession by other substances of qualities *closely resembling* those originally connoted. Here, however, there has been no lasting controversy: the facts are comparatively simple and were well understood, and here, consequently, the names have had to adapt themselves to the facts, instead of standing in their way and making the facts still more obscure. As before remarked, it is in the more complicated and difficult sciences of Conduct, Life, Mind, &c., that we shall find the best instances for our purpose.

Take the Free-Will Controversy. How is it that in many quarters there is so strong a disinclination to class voluntary with involuntary action, under the name of 'determined'? Clearly because that term, (and still more completely, 'necessary') and its contradictory 'free,' have gathered round them a narrower meaning, through their denotation, than their simple connotation would suggest. Since voluntary actions are obviously free from the only form of compulsion that Law and Morality are concerned, for purposes of punishment or exhortation, to recognise, these comparatively superficial needs were satisfied by the employment of the terms in the more restricted sense: and now that it is guessed that voluntary and involuntary acts may properly be classed together as opposed to 'free' in a wider sense, we are left with no word (or the doubtful possibility of introducing an entirely new one) to mark unambiguously their point of resemblance. If the first method be employed consistently, we must continue to shut our eyes to the now very probable fact that voluntary and involuntary acts are alike in being due to 'natural causes' and therefore increasingly predictable.

Again, as already indicated, the dissolution of old rough-and-ready barriers which must follow in the train of the Evolution Theory, is continually producing the same difficulty. If, for instance, we want a name to express the result of all that an individual has passed through, from the time when he existed only in the person of his remotest ancestor, there is in strictness (*i.e.*, by its connotation simply) no name so fit as 'experience'. We need not, indeed, suppose that Hume and his contemporaries, or even J. S. Mill, saw clearly their need of extending the name 'experience' beyond its denotation-meaning. But it can hardly be doubted that they *felt* the need of a wider name, and felt that there was no other name so suitable.

Numbers of words, too, such as 'belief,' 'memory,' 'knowledge,'

'perception,' 'feeling,' 'motive,' 'deliberation,' 'resolution,' 'volition,' 'intention,' 'desire,' &c., have been by custom applied to the conscious end of the scale only, and now we are practically compelled either to employ each of these words both in the wider and the narrower meaning, or refuse to group together acts and states which are alike in every point except the degree of consciousness of the agent.¹

Again, the whole question of Causation is full of these ambiguities. 'Invariable antecedent' strictly includes, but by custom excludes, the notion of unconditionalness: 'cause' strictly includes the notion of efficiency, but by definition, to suit the denotation, excludes it: if 'energy' had been defined only by assembling the particulars, and if we had refused to bind it together with its apparent contradictory, the Law of Conservation could never have been stated. 'Chance,' too, is excluded by the Law of Causation, and yet every time that a coin is tossed up, it is a 'chance'—in the narrower meaning—which side will come uppermost. 'Miracles,' in the widest sense, are excluded by it, and yet everything which contradicts the laws of nature as known to the human ignorance of any period, is in the narrower sense a miracle. The best inductions are 'certain,' in the sense which corresponds to the actual denotation of that term, and yet in its strictest connotation-meaning they are uncertain: they are more than 'probable' in one sense, and only probable in another. 'Impossible,' 'inconceivable,' even 'infinite,' have their wider and narrower meaning, and all these have accordingly become centres of much controversy and bewilderment that might otherwise have been avoided. Readers will remember the long list of contradictions, turning chiefly on the word 'infinite,' drawn up by Sir William Hamilton.

In every department we find the same. 'Law,' 'right,' 'obligation,' &c., have each their double meaning; and here may be seen a case where (since Austin's time at least) the denotation-meaning has on the whole won a firm footing, and yet has not succeeded in driving the connotation-meaning entirely out of the field.

Again 'subjective,' in Metaphysics, sometimes includes, some-

¹ For a modern instance of some clever and amusing acrobatic feats with these ambiguities, performed however on the whole in the service of truth, the reader may be referred to Mr. S. Butler's *Life and Habit*; and although it is not everyone who possesses sufficiently the painter's disdain for accuracy of detail, to rest satisfied, as Mr. Butler is, with the somewhat cheap remark that "Nature loves a contradiction in terms," or that, if we try to be consistent, we "may be good logicians, but we are poor reasoners," yet all must agree that he has stated some of the difficulties, and implied many others, in a very forcible manner.

times excludes, 'objective'; 'matter' is sometimes the supposed substratum, sometimes the well-known phenomenon: and until they are appropriated firmly and consistently to one meaning only, there is clearly no hope of an end to the disputes which cluster round them.

Before discussing the intentional re-arrangement of names, by the light of the most accepted rules of definition, it may be useful to glance at the changes in meaning, the narrowings and widenings, which are constantly taking place *without* any such definite intention. Some authorities, indeed, would tell us that this latter is the only manner in which alteration can occur. Prof. Max Müller has said: ¹—"Although there is a continuous change in language, it is not in the power of man either to produce or to prevent it. We might think as well of changing the laws which control the circulation of our blood, or of adding an inch to our height, as of altering the laws of speech, or inventing new words according to our own pleasure. As man is the lord of nature only if he knows her laws and submits to them, the poet and the philosopher become lords of language only if they know its laws and obey them." And though this is certainly an overstatement—a too literal acceptance of the epigram that language 'is not made but grows' (as may be seen from the fact that new words and modes of expression *have* been from time to time deliberately coined and gratefully accepted by the public)—yet there is sufficient truth in it to justify us in holding at least that the majority of changes are unintentional, that most changes in meaning (as in sound and spelling) take root and spread, steadily and silently, no one exactly knows how, and the fact only comes to light afterwards, through etymology and history.

Still, two main tendencies have been observed, to one or other or to both of which every individual change may be referred. The list of attributes originally connoted by a term may be either increased or diminished, or after proceeding for a time towards one of these results it may begin to move in the opposite direction. The meaning may become more special or more general, or first one and then the other.

It is not difficult to see, in the unintentional change to a more special meaning, or rather in the silent completion and establishment of that change, a striking likeness to the operation of the first of our two alternative methods. When, for instance, the meaning of 'resentment' was beginning to be narrowed down into connexion with injuries only, but while it was still possible to speak (as Barrow did) of the good man as a

¹ *Lectures on the Science of Language* (1862), p. 37.

faithful 'resenter' of benefits, and of the duty of 'testifying an affectionate resentment of our obligations,' there was some danger of ambiguity. In order to avoid this, one meaning had to be given up, and the world has tacitly chosen to hold to the class most frequently in fact denoted and to despise the less distinctly-coloured wider attribute which the term in strict right connotes. And so with numbers of other words: the plain old meaning of 'good,' and still more of 'simple,' and of 'worthy' (as applied to persons), is fast giving way to a more complicated meaning, derived from a contemplation of the actual members of the class commonly denoted. The two latter words have for some time been, and the former soon will be, terms of polite contempt; and it is not impossible that in process of time all three may become simply terms of unqualified abuse. The history of 'silly'—derived from *selig*—and of the modern German *schlecht*—which a few centuries ago meant *good*¹—will show what extreme changes in the meaning may be brought about by seeking for it chiefly in the members of the actual class from time to time believed to correspond with the intention of the name.

Equally noticeable, though not so complete, is the likeness between the second alternative plan for avoiding ambiguity, and the silent unnoticed change towards a more general meaning. The likeness is not so complete because here the connotation becomes actually smaller than it was originally, and the moving cause is rather the desire to name, and classify conveniently, existing notions, than to select and fix notions for existing but ambiguous names. But they are alike in one important point—the prominence which they give to connotation. Many cases of this change are, no doubt, directly the result of metaphor or poetry, as, for instance, in the words 'derivation,' 'to govern,' 'to equip,' or 'sphere'; but the use of metaphor itself springs from nothing else than a vision—often dim, or fanciful, or even false—of the hidden attributes which seem to underlie the more ordinary meaning and bind together classes commonly supposed to be in serious fact exclusive. It is because attention is paid to the attributes intended, rather than to the actual objects at any time believed to possess them, that new objects can be received into a class; it is when we think of the attributes rather than of the actual members, that the difficulty of drawing hard and fast lines begins. Man and beast and vegetable seemed much more clearly separated when people were content to 'know them by sight,' and before we had begun to puzzle over their exact points of difference and similarity.

¹ Mentioned by Professor Max Müller: *Lects. on Science of Lang.* 2nd Series, p. 248.

It appears, then, to be almost a matter of chance, that is to say, of complicated and untraceable causes, whether in remodelling any old classification, the public will be most inclined to preserve the denotation or the connotation of existing names. The most we can say is that specialisation appears to have happened wherever the denotation has been prominent,—where the class of things is (superficially) easy to distinguish, and therefore distinctly conceived in extension, and not liable to be disturbed by the applications of doubtful claimants for inclusion—wherever, that is, there were other marks more convenient than the connotation, by which to recognise the members of the class: and generalisation to have happened where the reverse has been the case. But which of the two results is either preferable, or on the whole actually preferred, is at first rather difficult to see.

Nor do we get much help towards finding out definitely which course we ought to take, from those who have written upon the subject. Mill's chapters, in the *Logic*, upon Definition and the Requisites of Language, useful and interesting as they must be admitted to be, are to some extent spoilt by the inconsistency with which, after having all through his earlier portion insisted on the all-importance of Connotation, and refused to allow to Denotation *any* part in 'meaning,' he finally decides that in many cases we cannot stand out against the denotation-meaning, but must accept it, and enforce it, whenever we think the change is already "irrevocably effected". It is disturbing also, to those who would be glad to know the purely logical bearings of the question, to find themselves warned away from "the shallow conceptions and incautious proceedings of mere logicians," and to see held up to gentle scorn "persons . . . whose leading and favourite idea is the importance of clear conceptions and precise thought". The sum of his advice apparently is,¹ that we should define, if possible, so as to prevent "the changes which usage is continually making in the signification of terms," and where this should seem no longer possible (towards deciding which question no advice is given), there we should submit "with a good grace," and, *if a definition is necessary*, define the word according to its new meaning. Try, that is, to avoid, in these cases, defining at all; but where definition should be forced on us, define to please the newspapers, and pretend to be pleased ourselves.

Now, passing over the difficulty, and in its finer shades, the impossibility, of knowing when a change *is* irrevocably effected, is it not probable that, in many cases at least of the firm establishment of a more special meaning, the old general meaning can never be really lost—that if we recognise the pretender, we shall

¹ Bk. IV., end of Chap. v.

only produce the confusion of a perpetual civil war? Try to apply the rule to actual cases of narrowed meaning, and we shall often find ourselves left with no name except the same one for the wider class. Try it with the term 'expedient,' or 'useful,' or 'necessity,' or 'certainty,' or 'pleasure': the attempt has in fact been made, over and over again, and some of the most undying controversies in the world bear witness to its failure. Or, to take an instance of specialised meaning mentioned in another place by Mill¹ himself: "Every word which was originally intended to connote mere existence, seems after a time to enlarge its connotation to *separate* existence, or existence freed from the condition of belonging to a substance,"—and if we should authoritatively define 'to exist' or 'entity' in this narrower meaning, is it not clear that when next we might have occasion to speak of the wider class we should find ourselves compelled to use the same word for it, and involved in endless ambiguity? It is true that by coining new terms—as 'entity' was itself invented when 'being' in the wider sense was discarded—we may stave off the difficulty for a time; but it should not be forgotten that, however fertile our invention may be in creating new names, our power of intentionally bringing them into circulation is limited. And besides, granting even unlimited power of doing so, we should only be throwing our babies out to the wolves; the ambiguities would overtake us again before long, and the three stages of danger, sacrifice, and temporary safety, would have to be repeated for ever, loading the language with ever fresh supplies of synonymous, and therefore confusing, names.

Professor Bain's suggestions² give even greater weight to the Denotation. We must "assemble for comparison the particulars coming under the notion to be defined," with the aid of those coming under the opposed or contrasting notion. "By the particulars are meant, not every individual instance, but *representative* instances sufficient to embrace the extreme varieties." We are then to cut off corners from the irregular mass, and to fill up its gaps, only *if need be* departing from the accepted denotation, "leaving out some instances and taking in others, until we form a class really possessing important class-attributes".

It will be seen that this method amounts on the one hand to an earlier yielding to accomplished facts, and on the other hand to a greater interference with them afterwards, than Mill would consider necessary and advisable. Mill recommends us to hold out against merely prescriptive right until our chance of success-

¹ *Logic*, Book I., Chap. iii.

² *Logic*, Bk. IV., Chap. i.

fully doing so is gone, and then to yield with a good grace, but Professor Bain would have us go more than half way to meet the usurper, and then try to buy him off with a compromise. Accordingly his plan is open to all the same objections as Mill's with the exception of the difficulty of deciding when we are beaten, and with the additional objection that, whenever we might arrive by means of it at a definition differing from Mill's, such difference would consist in its being less in conformity with actual usage, and therefore more difficult to introduce. Both plans are alike in being makeshifts, and hardly more than this seems to be claimed for them by their advocates. And in both there almost appears to be a tendency to confuse might with right.

Of the numerous cases in which the narrow boundary between 'is' and 'ought to be' needs careful watching, the fixing of a definition is one of the most ensnaring. For one reason, the identity of the language in which it is usual to frame both questions, helps to keep confusion alive. 'What is the definition of this?' or, still more, 'How would you define that?' may mean either 'What is the connotation given (dimly) to the name by a certain (vaguely limited) set of people?' or 'What *ought to be* the connotation given (less dimly) to it, by all who intend to make the best use of language?'

But even supposing this preliminary danger avoided, and the question clearly stated as an attempt to find what ought to be, the same confusion will probably arise again in deciding upon the answer. And there is some excuse for it: the originators of words, as we have already noticed, have often been unable or too careless to foresee all the complicated purposes which their gift would be required to serve in later days: they needed merely a means of making themselves understood at the time, and were content if the names which they gave were vaguely descriptive without being definitive. For, the purposes of classification and naming being ever less complicated the further back we look, the classes which satisfy one generation are not only less intricate and inter-dependent, but more roughly conceived and readily accepted than those which are needed to satisfy the next: the difficulty of identification does not appear to have sat so heavily on our ancestors as on us. Hence, we are saddled with words which ought to mean (and to some extent do mean) one thing, and which do mean (and perhaps *therefore* ought to mean) another; and we have to determine which of the two meanings—*de jure* or *de facto*—'ought to be' allowed to remain; to decide how far the founders' intention is really binding on us now.

In this perplexity, it may be of importance to bear always in

mind the main fact which the above illustrations show—that, whether through carelessness, ignorance, or economy, most general names have been *incorrectly* applied to the things which they are actually used to denote: that though they are always given for a purpose, this purpose is seldom completely, sometimes not at all, fulfilled. The classes of things denoted by a name in successive periods of time may almost always be regarded as a series of more and more nearly, but never quite, successful attempts to find things really corresponding to the notion:—‘pleasure,’ ‘happiness,’ ‘good,’ ‘useful,’ ‘expedient,’ may be mentioned as instances. If *attempts* be too strong a word to use for the numerous cases where failure has been due to carelessness rather than to ignorance—where we *knew* that the class was narrower than the name, but sacrificed correctness to convenience—we may at least look on the successive lists of things denoted as records of the lessening distance from correctness that our growing appreciation of what constitutes the truest convenience has allowed.

The fact that general notions are abstracted from perceptions of concrete things, may appear to contradict this view, as it undoubtedly contradicts the ancient error of Realism. It has been often said, and oftener implied, that notions are limited by things and can never rise beyond them; that there is always, as Whewell puts it, “a tacit assumption of some proposition which is to be expressed by means of the definition, and which gives it its importance”—that the notion ‘life,’ for instance, must include waste and repair of tissue, or growth, or decay, or death, or some one at least of the well-known facts which are found to accompany every form of actual life that we have examined. But would it not be more nearly true to say that in no single case is the notion actually limited by the things from which as a historical fact it was drawn; that it is always slightly in advance of them, more ideal, slightly an exaggeration, that is, of the attribute which they actually possess in common? The familiar instance of the notions in Geometry will be sufficient to prove that we can and, in some cases, do habitually raise an ideal beyond the parent facts: if we were to ‘assemble for comparison’ all the lines and points and circles in the actual world, however many excrescences we might afterwards pare away, our definitions would still have to mark *some* breadth, some parts and magnitude, &c. The tendency to generalise beyond our warrant is (for good or evil) as human in the formation of conceptions as in discovering the laws of nature.

But whether or no every general notion is ideal (in which case we may perhaps cease to deride Bacon for his speculations on the nature of heat), it is enough for our purpose here if any

are. For in those cases we must set up the ideal connotation, not that corresponding to the actual things originally denoted, as the object of our search, if we wish to find the meaning of the name—the purpose for which it has been always (more or less loosely) given: and when found, even if only by approximation, we must employ this ideal as the test by which to try the strictest right of any class of actual things to enjoy the name in its unqualified shape. We do this when we say that it is only 'practically' certain that the sun will rise to-morrow, or when the *minimum visible* is admitted to be only an approximation to a 'point'. Can we not also do it in the other cases?

To take again some of the instances mentioned above: the distinction between 'interested' and 'disinterested' was evidently made to mark the presence or absence of *conscious intention* to follow one's own interest, since at that time the possibility of the existence of a state of mind resembling 'intention' (denotation-meaning) in everything except the degree in which the intender recognises it, was hardly seen: the same distinction would now be as clearly marked as in the present state of knowledge it can be, by the terms 'consciously' and 'unconsciously' interested. The distinction between 'experience' and its contradictory was evidently meant to mark off from the universe the events that any individual had passed through *after birth* (or possibly after conception), since the continuity of the individual with his ancestors was at least not considered to be sober fact: the same distinction would now be achieved by 'pre-natal' and 'post-natal' experience. The distinction between 'free-will' and its opposite was meant to mark off such acts as might be prevented by the fear of punishment from such as could not: the same distinction would now be accomplished by substituting for 'free' as an explanation of 'voluntary' the narrower term 'practically free'.

Seen in this aspect the search for the strictest meaning acquires a clearer character, and the assembling of particulars loses its exaggerated importance. It is important, certainly, and can by no means be dispensed with: but it is now seen to be only the first step, not the chief part of the process. The really important thing is seen to be not the list of things that have somehow won the name, but the *reason* which (whether through mistake or carelessness or not) accounts for their having done so: and what importance the former has, is seen to depend on its being a guide to the latter. We cannot consistently set up as the chief and ultimate aim of our search both the list of things that *have* won the name and also of those that *ought to have* won it. Compromise, as usually understood, means nothing more than uncertainty and irregularity of plan. If we admit the

necessity of compromise (except in a sense to be presently suggested) we leave just the very question undecided upon which the whole search turns. We leave it doubtful, before trying to reach them, whether the grapes are sour or sweet.

It would no doubt be inconvenient to use the longer expressions always: the simple, unqualified ones would be generally sufficient. Perfectly precise language must always be more lengthy than epigram, and it is probable that, however much mechanical or other improvement may in the course of ages be made in facility and quickness of writing, and even of reading and speaking, there will still be a quicker method beyond—namely to drop so much of the precision as may be found on the whole superfluous. And hence a habit is formed of using the more rough and ready language, the convenient substitute for precision, until at last the substitute usurps full powers, gains a prescriptive right to rule our thoughts, and any attempt to restore precision and to point out to convenience its proper place, will be called pedantic or unpractical.

In fact, the need for avoiding pedantry and saving time would be an insuperable bar to a habit of duly qualifying all our general names. But it need be no bar to a habit of remembering that in strictness they *ought* to be so qualified. There is a tendency to think that because "what is present everywhere, once recognised, may be everywhere suppressed," therefore what is once recognised as present everywhere may be ever afterwards considered everywhere absent; and all that is necessary to correct this tendency, is to translate the second 'everywhere' into 'for many practical purposes,' and then to make clear what those purposes really are.

The necessity of compromise, for certain purposes, must be admitted; but it may be worth while to consider what those purposes are, and whether no alternative plan of meeting them can be devised. Is there perhaps, in these cases, a *modus vivendi* to be found, for both convenience and precision; a means of preserving both without their clashing, and of limiting each to its proper use?

Perhaps, instead of basing the entire process on compromise, instead of depressing our whole search for the best possible definition by the fear that, even if really found, we should not be able to bring it into daily use—thus searching for the best that will probably be allowed, while pretending to search for the best of all—it might be more consistent to institute two separate searches; first, for the really best definition, and, when that is discovered, then secondly to find how much accuracy must be surrendered, and *on what occasions*, in order to meet the business-requirements of the world. The ease with which

we do this in Political Economy, where such terms as 'wealth,' 'capital,' 'value,' &c., have a wider meaning than that in common use, seems to afford a precedent pointing to success. We should thus have two different phraseologies, one for the rough purposes of daily life, and the other for serious discussion and hard reasoning, the former inaccurate but convenient, the latter inconvenient but as strictly correct as possible.

If for instance we were to use, for ordinary purposes, the terms 'voluntary,' 'experience,' 'disinterested,' &c., in the ordinary acceptation, but at the same time form a habit of remembering that in strictness 'disinterested' acts are 'unconsciously interested,' that the events which happen to an individual after birth constitute only his 'later experience,' that 'voluntary' acts are only 'practically free'; on the one hand, believers in determination of the will, necessary egoism, or the explanation of all knowledge by experience, would be themselves guarded from the errors—which ill-considered opposition often helps to drive them into—of fatalism, belief in universal conscious selfishness, or disbelief in *a priori* knowledge; and on the other hand their opponents would see, more clearly than at present, that these three latter theories are all that anyone is really concerned to deny.

ALFRED SIDGWICK.

VI.—THE PERSONAL ASPECT OF RESPONSIBILITY.

Few things are more universally taken for granted than the high moral value of a belief in personal responsibility, and any one venturing to call in question not merely the scientific validity but the ethical excellence of any of the several assumptions grouped in such a belief, is likely to be vituperated without a hearing. Nor without reason; for when the moral title of a principle hitherto deemed fundamental is suddenly questioned, men's consciences experience a painful and possibly an injurious shock; and the indignation with which such questioning is met, or the reluctance with which it is tolerated, is due to a useful and perfectly justifiable instinct of moral self-preservation. People are wholesomely afraid of the consequences of being forced into impromptu defence of principles long regarded as so vital or so self-evident as to be independent of logical support; and nothing is more reprehensible than a wanton spirit of criticism which chooses to air its plausibility in the depreciation of beliefs closely concerning the higher emotions of those who hold them. The reformation of

moral principle is not effected suddenly or by force of argument, but is brought about slowly and silently, as it is needed, by the gradual working out of that social development which it appears to be its function to subserve. Any, therefore, holding an opinion distinctly opposed to a belief that passes muster with the public as necessary to the maintenance of practical rectitude, may well refrain from its premature expression as needlessly heretical: likely, in fact, to prove prejudicial to the popular acceptance of some greater truth on the admission of which it logically follows.

Nevertheless, occasions sometimes arise when the explicit repudiation, not of principles, but of current shibboleths which are mistaken for them, is clearly needed, in order to vindicate from inconsistency, or to rescue from misuse, some such greater truth which *is already* before the public, and which, when so vindicated, may itself operate powerfully as a reforming influence on a community recognising its bearings.

That such an occasion exists at present is indicated by the somewhat querulous discussions with which the air is rife, touching "mechanical" morality, and that discouragement of individual virtue which is supposed to follow on a belief in the modern theory of the natural evolution of society. It is certain that if ever the evolutionist's creed is to precipitate its principles in the practical form of a code, it can only be after a fair facing and resolution of the grave ethical difficulty which stands at its very threshold.

This is, of course, nothing less than the old difficulty about free-will and responsibility. To believe in a perfectly regular, not-to-be-suspended and not-to-be-hastened order in the phenomena of human development is to believe in the "necessary" character of every one of those benevolent impulses and beneficent actions which arise in the process of that development, and to which men have been accustomed to attach something of value over and above their mere social utility. When to the theory of social evolution we add the modern scientific views respecting the physical relations of consciousness, the logical resources of the belief in responsibility are further weakened, since such views undoubtedly tend to sweep aside as chimerical all ethical standards based on freedom of the will, reducing the loftiest and most far-reaching moral efforts to the irresistible reaction of a complex automatism or stimulus of which it had no share in the institution. In the temporary oscillation of the moral compass which ensues on the full perception of this aspect of scientific conclusions, it requires the strongest philosophic faith in the utility of truth to remain sure that whichever way the battle goes with reference to the

precious doctrine, the popular conscience will emerge from the conflict unscathed. Science must develop, and society must develop; and, at first sight, it appears that the only road along which they may peaceably progress together lies directly through the scientific justification of a belief in personal responsibility. Science, however, having already virtually discredited such a belief in her deliverances touching the genesis of morals, we find even philosophers, here and there, standing somewhat aghast in the presence of the considerations they have brought to light.

Does the salvation of conscience, then, depend at all on the precarious possibility of unravelling this gordian knot? Must an argument which should make short work of it by cutting it cut humanity at the same time adrift from its social and moral moorings, and expose it to wreck and ruin? I believe not. Nay, if truth demand the cutting of it, I am *sure* not; for truth ever remains the ultimate level upon which conscience and intelligence meet, and on reaching which each recognises in the other an invaluable ally. If the discovery of truth be intellectually excellent, none the less are its recognition and application morally so. Moreover, the welfare of society depends on no shifting sands of theory, but has its unseen anchorage in the profound depths of that irresistible impulse common to all organised existence, society included, to make for its own maintenance and further development. If the functional basis of morals be the perpetuation of this development through the development of social tendencies and sympathies in individuals, the security of morality may be at once inferred, even in the event of our having to give up the precious belief in our own *personal* deservings.

For such and little else is the belief in responsibility, if we strip it of all implications other than those which are threatened by science. Science has no word to say against the practical part of the doctrine. It is pure nonsense to assert that a man can only justly approve or disapprove his own or his neighbour's conduct, or must only allow such approval or disapproval to influence his further dealings, so long as he believes his own and his neighbour's conduct to be supported, each on a lever without a fulcrum—on a self-originating volition which might as well have been one thing as another. What possible connexion is there between the two propositions? Why should the appropriateness of moral approval, or of the practical linking of this approval with retributive dealing, be represented as dependent on whether or no the antecedent conditions of conduct had a beginning in consciousness? It is to me surprising that out of a doctrine which makes a point of extending the *sure*

foot-way of continuous causation into the field of mental phenomena, and which throws some explanatory light on the meaning of virtue and the conditions of progress, men should have extorted the strange corollaries that it is useless to try and be good, and unreasonable to dislike or resist what is bad. Is a watch that won't go the less a *bad* watch because it neither made itself nor wound itself up; or because its bad going is the *mere* result of bad spring and wheels? Shall we, on this account, disapprove it the less as a bad goer, and hesitate to take it to a watchmaker, to be put right if possible, and to be dishonoured and discarded as rubbish if incorrigible? Is a bad man the less a bad man—the less an unfit social influence—because he only follows his bad will, and did not originate it? Are we for such theoretical reasons passively to endure the results of his ill conduct, or to deem ourselves unjust for reprobating it and dealing with *him* in any way we believe fittest for reforming his will, or at least rendering it socially inoperative? Happily for society, men's morality does not depend on their lucidity of intelligence, and the occult process of reasoning which issues in such inconsequent conclusions, even if it could be demonstrated, could never be acted on.

The real moral lessons conveyed by a belief in determinism—in the connexion of every volition with certain antecedents uncontrolled by any previous volition of the agent, appear to be mainly these:—(1) In awarding our moral approval or disapproval we ought never to consider any one “by name,” so to speak; but in every case our judgment (of ourselves as of others, of others as of ourselves) should be strictly proportioned to the social value of the principle evidenced in conduct, no admixture whatever of any personal favour or dislike being allowed to emphasise either our judgment or its expression. (2) Our rewards for virtue must be *real* encouragements, and our punishments of vice *real* deterrents, following the laws (so far as we know them) of volitional conditions, and not merely arbitrary symbols of our approval or disapproval, however just these latter may be. We are not to hate the man whose dominating tendency induced him to¹ “fix his attention” (*i.e.* to *will*) wrongly, but we may *disapprove* him, inasmuch as we are a part of the society he hurts. Further, seeing that certain conditions, hitherto absent, may induce a future beneficial modification of his will, we may, so far as we disbelieve in the power of that will to resist such conditions when really presented, rationally set about instituting them, in the shape of new fears,

¹ *Vide* a published lecture entitled “Is Man an Automaton,” by Dr. W. B. Carpenter.

new deprivations, or new hopes and inducements. The morality and philosophy of the matter fit like hand and glove.

Nevertheless it is commonly assumed that the mere recognition that we are virtuous of necessity, when we are virtuous at all, is sufficient to remove that necessity and to render us vicious. It is only when we discover that the surplus value which rectitude is held to possess (beyond its social fitness) is the value it possesses for its follower *as differenced from the community* to which he and his conduct belong, that the reason of this apprehension dawns upon us. Nine times out of ten when a man speaks with unction of his responsibility, he is influenced, consciously or not, by a consideration less of his conduct than of his credit: less of the actual human worth of the deed or of the existing need for its performance than of its adventitious reflection on the baptismal name of the doer. This is no sneer. I think the phraseology of the subject bears me out. We hear of "shrinking from responsibility"—"disclaiming responsibility," and so forth, but not from great helpers, great saviours, or great reformers of their generation. These fix their gaze intently on the unrecognised truth which needs a preacher, no matter whom, or the stern duty which needs a performer, no matter whom, and fling themselves into the saying or doing of it with no thought of their *personal* responsibility.

It is scarcely sufficiently recognised in ethical discussion that the moral abstraction hidden away in the term Responsibility is in reality a compound of truth and fiction, and that (owing possibly to the long connexion of morals with theological beliefs) the fictitious element alone has been taken into account in the naming. Discriminating between the several and widely dissimilar ideas commonly present when personal responsibility is predicated of conduct, we find that the valuable element receives at the hands of the evolutionist not merely corroboration, but lucid interpretation. This valuable element is the recognition of the vast and permanent importance of all acts and forbearances: the dependence of weighty social consequences on the force and direction of human effort, and the appropriateness of a moral valuation of each man by himself, as by his fellows, strictly following the social quality of his deeds and tendencies. On the other hand, the distinctive part of the doctrine—all, that is, that distinguishes it from the moral lessons deducible from the doctrine of invariable physical causation—takes note only of the individual aspects of conduct; and so, is not, strictly speaking, *moral* at all. The tendency of the current commonplaces about personal responsibility is to insist, less on the virtue and healthfulness of truth, self-restraint, benevolence or industry, than on the merit of the person exhibiting such virtues: less on the

evil to society of dishonesty, cruelty, sensuality or idleness, than on the "answerableness" (whatever that may mean) of the sinner. The point about which so much metaphysical dust has been raised proves in the last resort to be one of those purely personal considerations of which moral advance consists in the gradual supersedure. Analysis discloses the heart of the dispute (concerning free-will, and the rest) to be less a question of morals than of merit.

It is at this point that we come in sight of what seems to me the moral insufficiency of the only part of the popular belief threatened by modern science.

A few brief remarks on the general character and meaning of moral progress may fitly preface what is to be said on this point; that so, having inferred the chief desideratum in any theory or principle claiming to exercise moral influence over its followers, we may observe how far the belief in question tallies with the required standard.

Broadly stated, the functional basis of morals appears to be the perpetuation of human development. This development presents itself under two aspects: (1) The evolution of society as a whole; (2) The evolution of the social or *super-personal* impulses, emotions, and tendencies in individuals. Virtue, functionally considered, amounts to the maintenance of humanity's fitness for survival so far as this maintenance may be secured by the civilisation of individuals through the medium of their own actions. That character is moral which (whatever the formulated principle recognised by its owner) issues in conduct conducive to the well-being, not necessarily of the personal agent, but of his kind: which keeps man at the head of things, and elevates his headship. That motive is moral which implies a desire to exhibit such conduct so far as the agent knows how. Just in proportion as the desires and purposes of the individual lead him to conform to social requirements, and to merge self, *the person*, in self, *the social unit*, can he obtain a virtual mastery over his conditions. Happiness consists in such mastery; rectitude, in the conformity which leads to it. The rectitude and the happiness, however, do *not* necessarily meet in the same personality; and in the artificial correction of this special instance of a naturally incomplete adaptation of our circumstances to our requirements lies the essence of all good and wise law-making, as also of the purification of public opinion, that most powerful of all social engines.

If the function of morals be to subserve the interests of the community, those motives and principles must be most moral which concern themselves most closely with the welfare of the community, and which have least regard to considerations

indifferent to that welfare. The most moral belief, again, must be that which tends to the institution of such social motives and principles; and which, in its indirect effect on the emotions of its follower, brings his will increasingly under their power. Quite in harmony with this conclusion is the fact that the central principles of that large body of rules and regulations for individual consciences which the felt consequences of conduct have caused to be empirically established as right—which have been permanent and which come into increasing prominence and play wherever a community advances in coherence and organisation—have always taken form as in some sort a merging of personality. A high degree of enlightenment and prosperity, or swift progress towards it, commonly accompanies the high estimation of such principles as self-government, sympathy, and equity. The latter especially is the crowning virtue of civilisation. From first to last moral advance appears to have consisted under varying disguises in the slow surmounting, not of individual distinctions, but of *personal* considerations: in the gradual lessening of the weight of special interests, whether egoistic or altruistic, in the balance of morally permitted motives, and in increasing the preponderance of what are virtually race-instincts as a compelling agency in the conscious lives of individuals. In states pre-eminently civilised we find teachers, governments and even public opinion busy, more or less consciously and more or less successfully, with the inculcation of ends, and the institution of restrictions bearing directly on the products of individual character and conduct, as affecting the vital resources, not of the agent *per se*, but of the community; the interests of the agent being included only in proportion to his capability of development in social conditions. Society is no impersonal structure; neither as regards the requirements of its development is it a merely magnified person; but it is a great super-personal organism into which the self-hood of every one of its units enters not merely as a modifying influence or a supplementary end, but as an essential ingredient. The requirements of society include, while transcending, the requirements of the individual; and, when supplied, yield what is *felt* as an improved quality of happiness (though seldom as an increased quantity) to each individual who lives in practical recognition of his share in a larger life than his own. The most virtuous man is he who is able habitually to regard, and to deal with himself, his friend, his enemy, and a stranger from the same standpoint; that is, from a point where these distinctions of self, friend, enemy, and stranger disappear, along with the special emotions belonging to them, in the distinction each assumes as a better or worse social member to be judged and treated by a human test alone, as if

nothing more circumscribed than the whole future of the whole race were concerned in the matter. The most moral valuation of personal morality must be that which regards conduct exclusively in its super-personal or social aspect, and which disregards its emanation from or reaction upon a given agent otherwise than as he too is a part of that whole his conduct must affect.

Provided with this test, if we return to the belief in personal responsibility, we find that, so far as it means a belief in the proper merits or the proper rights of persons, it falls *morally* short. For instead of placing the impulse to self-service or to self-sacrifice, as such, under orders to the dictates of the impulses conducive to race-preservation, it tends directly to reverse the process; and so far as it confines attention to the real or supposed reaction of conduct on the *personality*, as distinguished from the *humanity* of the agent, it does so at the expense of that purely social valuation of individual conduct, on the unbiassed integrity of which a true morality ever insists. Humanity suffers or may suffer in the person of self if the interests of less fit social members be taken into consideration *merely* because they are *not* self; and conversely, humanity may suffer in the person of others or of an other if conduct be modified by a consideration of one's merely personal relationship towards that other. The insistence on personal responsibility frequently means nothing more than an insistence on this personal relationship as giving a special moral colouring to conduct. I, at least, run more risk of self-deception as to what is my duty towards my neighbour in a particular conjunction of events if, instead of looking the position simply in the face with a single eye to doing the fittest thing, so far as I know it, I mentally attitudinise before my own relationship to my own conduct, reflecting on my own responsibility as if the eventual deed either gained or lost in intrinsic importance from the circumstance of *my* happening to be the doer. True virtue requires that we regard neither first nor second persons when a question of duty arises. Our moral judgment of third persons is more likely to be reliable and equitable, and the moral man must endeavour to appear as a third person in his own eyes.

In order to strain the principle advocated to its furthest capability, and to give dissentient readers the utmost room for correcting it, I take an instance in which, if ever, personal considerations may be held to intensify moral obligation. A father is said to be specially responsible for the moral training of his child, by which it is meant that he is liable to be specially disgraced in the eyes of others if he neglect such training. It is implied in this that the man is to the same extent

irresponsible for the moral influence he exerts over other people's children: that the personal relationship or its absence is alone sufficient to modify moral obligation; that, other things equal, his child's training *ought* to be a matter of greater concern to him than that of other children. Other things are *not* generally equal, or the moral fallacy involved would at once disclose itself. For the doctrine implies that the father deserves to be more disgraced for failing in what is a matter of general social duty towards one human being than towards another, the distinction all the while being one that concerns no one except himself. So far as the judgment concerning parental responsibility hints at the importance of senior guidance for the young, it is moral and true: so far as it specifies one child as of more importance than another coming under similar influence, and colours duty with a personal consideration of no value to the community, it is at least non-social, and, through its tendency to withhold a parent's attention from the human (which he may of course regard as the religious, or otherwise transcendental) meaning of his conduct, may become eminently immoral. Just so far as the father is practically influenced in his dealings with his child by a consideration of his own personal relationship, and the extra importance that relationship may give to his conduct in the estimation of those he knows, just so far is the good of the child subordinated in his mind to his own credit, and the tendency must be to lessen such considerations as, while concerning the child's good, are yet in no way related to that credit. Just in proportion to the access of value an action receives from the personal aspect of responsibility will be the loss of regard in which a precisely similar case is held when such responsibility is supposed or known to be absent. The question is to me unavoidable—Would not this loss operate harmfully on any one coming under the influence of the conduct based upon it?

Of course no question is here raised as to the appropriateness of the parent's greater love for his own child. Domestic welfare lies so firmly and deeply at the roots of social welfare that any principle threatening the former might well be mistrusted as unlikely to prove a true friend to the latter. What is here maintained is not that a father should not feel a stronger *affection* for his own child than for another, but that, when both are equally under his influence and control, his sense of "responsibility" concerning each child respectively should be precisely equal. He ought to treat both children with equal moral solicitude, and from the same motive. I profess to derive this "ought" from the highest sanctions of civilised morality. I submit that in recognising (as all must) the rectitude of such equitable dealing and equitable

feeling on the part of the supposed parent, the title of super-personal conduct to our moral approval is granted ; and that, by implication, the special *responsibility* of the parent—that is, his title to special reprehension in the case of his neglecting his own child rather than the other, or the other rather than his own—is disproved. If this be true, a doctrine presenting the reverse principle of an insistence on personal distinctions, whatever else it may have to recommend it, cannot be moral.

A formidable objection is often made to a doctrine which, while upholding the ancient principle of the excellence of virtue, yet denies the free-will and consequently the personal merit of the virtuous agent. It is said that such teaching, to be logical, must make no account of conscience or of conscientious motive as such, since either is liable to be misguided. I, however, entirely disclaim any imputation of undervaluing the great utility of conscientiousness as such. There may be no *merit* in being conscientious, but, according to the social standard of excellence, there is great *good* in it. A person's susceptibility of feelings of pleasure or pain in proportion to the conformity or non-conformity of his own conduct with any standard having a basis wider than his own interests is what, I suppose, we mean by his "conscience". It may not inaptly be compared with a social nerve which, in measure of its development and activity, gives its possessor a place in the sensorium of the community. However misguided it may here or there be—however vague or even inaccurate in its response to the demands made upon it—it is yet the finest product of past millenniums of human socialisation. I even incline to agree so far with the orthodox moralist as to affirm that a *right* (that is a conscientious) motive prompting a *wrong* or erroneous act is a better thing than a useful (extrinsically-moral) action which has been prompted by a selfish motive. Why? Because the tenour of a life signifies more to the community than its single acts, and the degree in which a man habitually acts upon the suggestions of his conscience is pretty certain to correspond with the degree in which he is amenable to considerations wide of his own concerns, as such. In other words, conscientiousness is potentially, even where it is not actually, moral.

I, however, dispute the moral legitimacy of using this "social sentence" in cool blood as a means of personal gratification : of looking forward to its favourable verdict—which, as is admitted, is *not* always a faithful verdict—as an end to be kept in view when aiming at rectitude. Whatever his "merit," a moral man looks out from self at facts, and aims straight at their fit adaptation to what he deems right, with no side glance at his own reflection in to-morrow's eyes to see what figure he cuts while taking his aim.

Finally, it may be objected that it is both foolish and wrong to cry down men's ready belief in their own merits, since such a belief has constantly proved a valuable stimulus to well-doing. Doubtless it has. But a useful stimulus is one thing: a permanent and necessary vital condition is another. Alcohol is often useful to keep flagging physical power up to working-point: taken medicinally it may even save life: but the healthier the life the less the need of its services. Similarly, I am not here concerned to show that the idea of personal merit has never done good, or that where a belief in it can be honestly held it may not in the future do good again: but I desire to show that it is not necessary to normal moral vitality, while it has very often done harm and indirectly produced misery by leading men to claim personal recompense as their natural due for conduct which in the nature of things produces only a social result: causing them to feel ill-used of gods and men when such recompense has been withheld. Until we have learnt to rectify sub-human nature's oversights, and to apportion our rewards on a principle more complex than hers, such expectations are doomed to disappointment; it being about as reasonable to expect in the natural course of things a *personal* reward for a *social* effort as to expect a physical reward for an intellectual effort: the removal of a disease, for example, by the solution of a mathematical problem. Since those among us who accept unreservedly the conclusions of modern philosophy must learn to do without any belief in our own merits, it is just as well to recognise the consoling fact that men may yet care to do right after they become convinced that they are not fine fellows for doing it, and that the rectitude which persists in action independently of personal bolstering is the highest and most invincible rectitude of all.

It cannot be denied that a sense of merit masquerading as "honour" has often done good service in prompting men to deeds or strengthening them for forbearances which they were not sufficiently socialised to desire for their own sake. But though in nine cases such a sense might lead a man right, in the tenth it might lead him wrong, thus disclosing itself, not as an essential principle of morality, but as the falsely-assumed rule which is disproved by an exception.

However generally useful we may allow the sense of honour to have been, it is none the less true that a wide-spread feeling exists testifying implicitly to its moral second-rateness, and recognising the love of virtue as morally superior to the love of glory, the dread of vice to the fear of disgrace. And the existence of such a feeling, however small the operative power it as yet possesses, indicates a dim recognition of the higher social value of such a standard whenever it is seen in operation.

The desire of public approval is not necessarily identical with the desire of public good. It is at least equally allied with the paltry desire of public notice which may be and sometimes is clearly exhibited immorally by felons in the commission of crime, and non-morally by speculative or artistic egotists in the production of work differing from that of their compeers only in the matter of eccentricity. Men are slow to learn that even their own glory must play second fiddle to the wants of a solidifying community, although it is a happy thing for themselves and for the community when at last they do learn it. Life is at once simplified and beautified, and many faults of character with their attendant miseries vanish spontaneously when the individual learns to content himself with what Emerson calls "his social and delegated quality,"—when he sees that whatever "respects the individual is temporary and prospective like the individual himself who is ascending out of his limits into a catholic existence".

When at last the merely rational theory we have been slow to learn as such flashes into light as a substantive truth which it is beyond our power ever again to ignore in our computation of things and their values, and when we become intimately conscious that our goodness is not in any sense of our own providing—when we have reached this belief as a realised practical conviction, I say, we never want our personal merit back again. In reaching the point where such a conviction becomes possible we have left behind us all other points at which the belief in personal responsibility, having been honestly tenable, has been in any degree useful. We have also unconsciously outlived that in us which received gratification from the contemplation of merit; the love of goodness which needed a love of self proper to eke out its small propelling power being transformed into a larger faculty which needs it not.

L. S. BEVINGTON.

VIII.—NOTES AND DISCUSSIONS.

MR. LEWES'S DOCTRINE OF SENSIBILITY.¹

Mr. Lewes's *Physical Basis of Mind* has already been subjected to searching criticism in the pages of this journal. But we trust that the importance of the subject may be held to justify a few farther remarks on his view of Sensibility, Sentience, Sensation,—the various aspects of Feeling,—giving as it does the key to his position in reference to the question of the forces that determine animal action.

Shortly stated, Mr. Lewes's view seems to be the following :—That Sensibility is the property of combining and grouping stimulations ; that it belongs specially to nerve-centres, but to these in whatever part of the organism they are present ; that the sensory reactions, when numerous and consentient, are attended by consciousness (the function of the organism as a whole), but that this is no invariable mark of sentient states ; and that sentience as such, whether conscious or unconscious, is radically distinct from mechanical force in all its forms.

From this statement it appears that Mr. Lewes gives to the terms Sensibility and Consciousness a mainly physiological value. To this in itself no objection can be made ; for, though it may be a question whether he does not thereby add to the confusion and ambiguity of language which he himself deplors as a bar to the progress of psychology, he is of course entitled to use terms in any sense in which he defines them. But it is quite legitimate to remark that, on this view, Sentience has not the character of a fact or phenomenon ; no account can be given of its nature ; it can be described merely through the effects which it produces and the source whence it springs. Hence, no doubt, comes the lame and tautological character of some of Mr. Lewes's explanations,—as that “the reaction of a sensory organ—called by the physiologist a sensation—is always a sentient phenomenon,” and that “it is the physiological reaction of the living organism which constitutes sensation” (pp. 193, 420). Further, it is of more importance to observe that, on this view, Sensibility is merely an endowment of nerves, equally physical with any other which belongs to them as part of the material framework of animal life. This, indeed, Mr. Lewes would be far from allowing. He dwells on the distinctions between organisms and machines, and finds the two to be essentially different. But the difference which he finds, he cannot, it seems to us, account for. The questions discussed in his third and fourth essays are—What is the character of reflex action ? and—May animal action in general be regarded as the result of purely physical processes ? These questions he answers by pointing to Sensibility as the motive power peculiar to animal organisms. He says in effect : All animal action is reflex, but, even when unconscious, it is the result of sensibility, of vital force residing in the organism,—it is a sentient, not a physical,

¹ This Note (by the daughter of the late Sir William Hamilton of Edinburgh) was in type before the death of Mr. Lewes.—Ed.

phenomenon. And, since even unconscious actions are due to the operation of Feeling, much less can it be affirmed that those which evidently spring from it are the result of merely physical processes. But Mr. Lewes's conception of sentience as wider than and not implying consciousness, renders ineffectual his denial of the automatic character of animal action. For what is the essence of a mechanism? Is it not that the source of action is external—that the sequence of acts is determined from without? And, as long as action is so determined, and all results are produced by external force, is it of much moment whether the mechanism be of one kind or another, organic or inorganic? A plant has life, a stone has none; but we deny that the one can in any real sense act more than the other. That the processes of animal action are to a great extent mechanical is allowed by all. But on the automatic theory they are nothing but mechanical, there is no such thing as spontaneity in animal life.

Thus the very matter in question is the source of impulse; and, if that be traced to any material agency, it matters not that it be called sensibility,—the conception is equally a mechanical one. We fail, therefore, to see that Mr. Lewes's theory, in replacing a mechanical by an organic view of the production of action, or rather in setting up a sensitive instead of a material mechanism, differs in any essential respect from that against which he contends; or that the word sensitive has any particular value, when sensibility is reduced to a purely vital property, and the springs of action are traced to the harmonious play of parts in a complicated organism. Similarly, on Mr. Lewes's prevailing conception, his denunciation of the "exclusion of sensibility from the actions classed as reflex" seems an elaborate strife about words: for what, after all, is the difference of any moment that separates him from his opponents? Both sides have to account for the fact that, under the influence of external stimuli, complex acts are performed by animals which have suffered serious and extensive mutilation of the nervous system. Both hold the effects observed to be the result of neural processes. Both regard these processes as unconscious. Only the one calls them sentient, the other insentient—the one mechanical, the other organic. Where else than in the names lies the difference? Mr. Lewes refers to a number of cases as evidence of sense-guidance in the absence of the brain. But, if sentience be merely the power of combining stimulations, how are the effects of sense-guidance to be discriminated? That the stimulations are combined, and so as to resemble the effects of sense-guidance, is allowed by all. The very question to be answered is: How are they combined? By physical properties, or by the sense of pleasure and pain, or by intelligence?

But, while Mr. Lewes's view of sensibility and consciousness is mainly physiological, it would be inaccurate and misleading to represent him as keeping out of view the mental elements which they undeniably possess. According to him, sensibility, though itself a property of nerves, has in sentience a "subjective side" or "psychological equivalent," which is "the substance of all knowledge".

Consciousness, while physiologically a function of the organism, is, "strictly speaking, a psychological, not a physiological, term," and designates either all psychic states or that class of such states which is attended by a reflected feeling of attention. And, if it be objected that such attempts to give to the same phenomenon intellectual and physical attributes, and to place it at once in the spheres of mind and matter, involve a fatal contradiction, Mr. Lewes is ready to reply that this, on the contrary, is the very foundation of his theory; his view of sentience being merely an application of the more comprehensive theory of "the twofold aspect," on which he explains the connexion between mind and matter, by supposing that, not only the neural process and the conscious state, but soul and body, nay, all that is physical and all that is mental, are related to each other as respectively objective and subjective phases of one underlying reality.

Mr. Lewes makes much use of the terms "subjective" and "objective," and claims by their aid to have solved one of the most difficult of metaphysical problems. But they are proverbially dangerous—apt to rend any system into which they have without due care been introduced: and, even as philosophical terms with a definite and recognised meaning, it appears to us that Mr. Lewes is not sufficiently guarded and precise in his manner of using them.

When we distinguish various aspects of any reality, we imply that we are face to face with some object, which in certain of its attributes remains unaltered, while in others it varies according to the point from which we regard it. The thing in its essence does not change; our relation to it is what changes. So much for aspects in general. In regard to the particular aspects in question, the terms "subjective" and "objective" relate to knowledge or thought, and to that alone:—they have no meaning save in reference to an act of intuition or conscious experience, which has as its poles the two correlative elements of the subject, or that which knows, = self, and the object, or that which is known, = not-self. The reality implied in subjective and objective aspects is the content of such an act of intuitive knowledge, which is regarded subjectively as a mode of self, objectively as a quality of not-self. But, because the reality is one, this content, whatever it be, must remain the same under the opposite aspects which by turns it presents; *i.e.*, what is considered, now subjectively, now objectively, must be the very same datum, one in time, in antecedent conditions, in all relations save that which it is conceived to hold to the subject and the object of the act of knowledge.

Now, all these conditions are violated in Mr. Lewes's application of the contrast of subjective and objective aspects. When, *e.g.*, he calls a conscious state or a change in feeling the subjective aspect of a neural process, he both assigns a subjective aspect to that (neural process) which can have none, because it is not the content but the object of an intuition, and designates as subjective and objective aspects of the same reality the data of separate and distinct acts of knowledge. When two things are subjective and objective phases of the same, we cannot have the one without the other, or do away with the one without,

ipso facto, doing away with the other. But here we can undoubtedly have the one without the other, since the apprehension of a neural process is no conveyance of the corresponding sensation, nor *vice versa*. In fact, the two never are apprehended together; and so far are sensation and the nervous system, soul and body, the mental and the material, from being indissolubly bound up in the same act of experience, that each is only remotely connected with the other by a chain of reasoning. Whereas in the case, *e.g.*, of colour, where the material quality and the visual sensation are unquestionably objective and subjective phases of the same, the coloured surface and the affection of the organ of sight are absolutely simultaneous, and determined by identical conditions: in fact they are the very same thing, which is only diversely thought about. Liberty and law are simply various aspects, because your liberty *is* my law differently expressed.

Mr. Lewes's plea (p. 403) for the admission of Consciousness as "a factor in the so-called conscious and voluntary actions," affords an example of the misleading effect of making aspects, or the relations of knowledge, convertible with the relations of existence. It is argued that, though consciousness is a purely subjective process, yet, because subjective and objective processes are but two faces of one reality, feeling is justly said to determine action. But two such faces must remain apart as eternally as parallel lines, and action, as that which is to be expressed in terms of matter and motion, can no more be determined by a purely subjective consciousness than can such a consciousness be determined by the movements of matter through space. If consciousness be an aspect, it cannot be a factor,—any more than the convex surface is a factor in the production of the concave; and, if consciousness in this manner accompany molecular changes, it can no more affect the character of the series than the colour of a row of balls in motion can tell upon the force of their mutual impact.

It appears, then, that Mr. Lewes's theory of Sensibility lies open to grave objections. It does not satisfactorily account for the phenomena with which it deals; it cannot hold elements which yet it is compelled to admit. We thence draw an argument in favour of the purely psychological view, according to which sensation is a form of consciousness, and consciousness another name for immediate knowledge. But if consciousness be knowledge, even of the lowest and most rudimentary kind, it cannot be a mere organic process or a function of the organism; it must imply a *self*. That is, knowledge is not interpretable without reference to self. It is this reference that is implied in Mr. Lewes's account of it as the function of the organism *as a whole*. But the unity of the ground and source of consciousness cannot be explained as the mere harmonious action of parts. We come to connect our consciousness with the organism, but what is given in it directly is *states*—of that which, when known, (but this it need not be and very generally is not), is known as self. It is quite certain that in no conscious state, of whatever kind, have we the direct suggestion of a consensience of organic parts, while in

reflectively conscious states we cannot help being aware of "I" as thinking or feeling. Mr. Lewes says:—"The organism is in its objective aspect a physiological mechanism, in its subjective aspect a psychological mechanism". What is "a psychological mechanism"? Psychology knows nothing of mechanism. It has to do exclusively with states of feeling, of volition, of thought. These may or may not be produced by mechanical agency, but we must pass beyond psychology in order even to try to ascertain the fact.

The recognition of its conscious character yields a much more intelligible account of sentience than Mr. Lewes is able to give. Whereas he can define Feeling only through its results and its source, states of feeling as conscious become the simplest and clearest of facts, known with a directness and certainty beyond that of any other order of facts. Feeling, under the two heads of sense and emotion, becomes a general term for all conscious states in which self is preponderantly passive and subject to impression, and in which there is the qualitative apprehension of a state. Of course there are many stages of consciousness,—*e.g.*, that of molluscs and that of men,—and in these Feeling appears very variously combined with other elements; but in itself it is throughout the same.

Mr. Lewes cannot on his view consistently explain *how* Feeling determines action—how what is subjective passes into the objective sphere. From the other point of view, Feeling is a spring of action through the excitation of desire under the sense of pleasure and pain. Doubtless, also, it is from overlooking the reference of consciousness to self that Mr. Lewes seems to deny any essential distinction between voluntary and involuntary actions.

We would reiterate that only through the recognition of the self involved in consciousness can the controversy against the doctrine of animal automatism be carried on to clear, broad, and well-defined issues. Self is the only really spontaneous source of activity; nothing else yields any valid ground of escape from the mechanical conception of life. Mr. Lewes seeks (p. 407) to prove that "consciousness is legitimately conceived as a factor in the so-called conscious and voluntary actions," and that the animal organism is not to be classed among machines, on the ground that "the collateral product of one movement becomes a directing factor in the succeeding movement, —that being precisely what no automaton can effect, unless for changes that are pre-arranged". But, in the first place, it is of the essence of a machine that the product, direct or collateral, of one movement should by *pre-arrangement* give rise to the next movement, and Mr. Lewes assumes that the particular collateral product which he has in view does so *impromptu*. In the second place, that product (sensation) does not—he himself allows that it cannot—itself give rise to succeeding movements; for the same experience which assures us of the sensation of heat or moisture or roughness, excited, *e.g.*, by the motion of the hand over a surface, assures us that the direction of that motion is changed not by this sensation but by ourselves under its influence.

This evidence, therefore, fails to prove the conclusion which it was meant to establish; but, on the other hand, it unquestionably implies the element of self ignored by Mr. Lewes. Again, that element is implicitly recognised in the appeal to consciousness which Mr. Lewes makes as a last resort in his contention against the automatic theory, and which, as was formerly remarked in *MIND*, "is somewhat confounding when it comes from him". The very term "subjective," so constantly employed by Mr. Lewes, if meaningless apart from knowledge, is equally meaningless unless knowledge be conceived as a relation between self and not-self. Without allowing that there are "the strongest reasons for concluding that every feeling, every change in sensibility, is the subjective aspect of an objective organic change," we note here and elsewhere the repeated application of a word which binds Mr. Lewes to the recognition of an element not allowed for in his theory. When Mr. Lewes tries to prove that all actions are reflex and all sentient, by adducing evidence of sense-guidance from the behaviour of animals which have been decapitated or deprived of their cerebrum, he is again driven to an implicit recognition of the mental character of sensation. For this evidence does not prove sentience without proving a great deal more than he allows to enter into sentience. As Mr. Lewes gives no signs by which to discriminate sentience in itself, he can show it present only along with volition and intelligence as well as consciousness, and is driven to what he himself feels to be the absurdity of claiming the power of choice for headless reptiles. His signs of sentience are really signs of consciousness.

It appears to us that Mr. Lewes makes good his contention that the brain is not to be looked on as exclusively the organ of sensation,—that no one part of the organism is in itself the exclusive seat of sensation. But, while his position is—"not the brain but all nerve-centres," ours would be—"not the brain and not nerve-centres at all, are primarily and exclusively the seat of sensation". If individuality be the root and principle of sentient life, the brain may be the organ of sensation, as (what Mr. Lewes calls it) "the centre of centres," fitted, by its connexion with every part of the nervous system, to be the physical counterpart and medium of the *ψυχή*. It is because this communication of individuality must be impaired by loss of the brain, that we are led to suppose the physical properties of the nervous system to suffice, under stimulation, for the production of the effects observed. Besides, the comparative unimportance of the brain in certain forms of animal life may chiefly, perhaps, indicate the low type exhibited in these forms, even when the organism is in its normal state.

Thus, while holding with Mr. Lewes that Feeling is a force, we venture to differ from him both as to its real relations and as to the mode of its operation, and to assert that his account of these is not such as to remove the confessed difficulties of the subject, or to be accepted as finally sufficient.

E. HAMILTON.

PROFESSOR MAXWELL ON THE RELATIVITY OF MOTION.

UNDER the title *Matter and Motion*, Professor Maxwell furnishes one of the series of "Manuals of Elementary Science," published by the Society for Promoting Christian Knowledge. In its hundred and twenty small pages are presented the more important conceptions which students of physics and astronomy have arrived at as a means of grasping the phenomena of the material universe. A *prolegomena physica* of this nature is of very great utility; but how well adapted to the general public this attempt by Professor Maxwell is, how digestible the large amount of nutriment in this form may be, we shall not here surmise. We propose merely to bring forward some considerations regarding the relativity of motion, especially in reference to rotary motion, which are contained in the book or suggested by it.

On page 20, after speaking of the position of a point as its distances and directions from other points, Professor Maxwell says:—

"All our knowledge, both of time and place, is essentially relative. When a man has acquired a habit of putting words together, without troubling himself to form the thoughts that ought to correspond to them, it is easy for him to frame an antithesis between this relative knowledge and a so-called absolute knowledge, and to point out our ignorance of the absolute position of a point as an instance of the limitation of our faculties. Anyone, however, who will try to imagine the state of a mind conscious of knowing the absolute position of a point will ever after be content with our relative knowledge."

Having then established the fact that our knowledge or conception of position involves only the geometrical relations between points and consists entirely of our knowledge or conceptions of those relations, Professor Maxwell proceeds to consider motion and rest, and to show the relativity of these also. Evidently since position is relative, motion, which is the change of position, must be relative to at least an equal degree. On p. 29 we read:—

"It is true that when we say that a body is at rest we use a form of words which appears to assert something about that body considered in itself, and we might imagine that the velocity of another body, if reckoned with respect to a body at rest, would be its true and only absolute velocity. But the phrase 'at rest,' means in ordinary language 'having no velocity with respect to that on which the body stands,' as, for instance, the surface of the earth or the deck of a ship. It cannot be made to mean more than this.

"It is therefore unscientific to distinguish between rest and motion, as between two different states of a body in itself, since it is impossible to speak of a body being at rest or in motion, except with reference expressed or implied, to some other body."

Thus all that we can know or conceive with regard to position, motion and rest, consists of the geometrical relations between the points concerned and the changes of those relations, and this is indeed all that the words *position*, *rest* and *motion* mean.

Let us illustrate this. We will suppose that the universe consists

of a sphere and a ring, and that the sphere passes and repasses through the ring. And, that this ideal universe be as simple as possible, let all the points of the sphere move in straight lines with regard to the ring. Thus we will suppose it to swing to and fro for ever. We will people these bodies. The inhabitants of the sphere then will see the ring approaching, surrounding and passing them to return and repass. The inhabitants of the ring will see the sphere approach, pass through their world, and depart to return and repeat its motion indefinitely.

Now, it will be quite in accordance with the ordinary use of language for the inhabitants of the ring to speak of the sphere as in motion, and for the inhabitants of the sphere to speak of the ring as in motion. And if they wish to represent astronomical phenomena in their lecture-rooms, the inhabitants of the ring will make their miniature model of a ring stationary in the lecture room and cause the sphere to move to and fro through this. The converse will be the case with the scientists on the sphere. Nay further, in conceiving the phenomena in their own minds, those on the ring will be apt to imagine a model constructed in one way, those on the sphere in the other. Now, it is evident that in both these ways of representing the actual phenomena, whether in models or imagination, both parties are right. In the models the sphere and the ring must have specific relations of motion or rest to the walls of the lecture-room, just as they must have wires to support them and machinery to keep them going, but the relations to the walls of the lecture-room do not represent the real astronomical facts any more than do the wires and the clockwork. And if, when we imagine the models, we find it easier to conceive the one thing or the other as at rest with regard to ourselves, we must not forget that this relation is not one that reproduces what we wish to reproduce, namely, the changes of configuration of the system.

It is well to become perfectly clear with regard to this matter. We must not, for example, imagine that the two parties see different sides of the same thing. They do in fact see the whole of it.

Nor must we regard the two views as two different theories, each with a certain number of facts in its favour. There is only one theory, and all the facts sustain it. But there are two different ways of representing it.

We have spoken above of the particles of the sphere as moving in straight lines *with regard to the ring*. We have here to show that the expression *move in straight lines* is meaningless without an expressed or implied reference to a body with regard to which the motion is straight. Suppose that a pea is propelled through a straight peashooter. If each point in the peashooter is at rest with regard to the ring in our former example, then the inhabitants of the ring would say that the pea moved in a straight line. But if the man with the peashooter moved it about while the pea was going through, they would say that it moved in a curved line. If he should move the peashooter so as to keep it at rest in all its points with regard

to the sphere, the inhabitants of the sphere would say that the pea moved in a straight line, and the inhabitants of the ring in a curved line.

Nor would there be any difference between the two views, because in the one case reference to the sphere, in the other to the ring, is understood. It is therefore evident that, in speaking of motion, not only the amount, but the direction of the motion and the nature of the trajectory as being straight or curved, contains an implicit reference to some other body.

Now, the question arises to what body is reference had in the use of the word *straight* in Newton's first law of motion. The law runs: *Every body perseveres in its state of rest or of moving uniformly in a straight line except in so far as it is made to change that state by external forces.*

If we confine our attention to terrestrial phenomena, we find that the law is in all ordinary cases sensibly true, when by straight we understand straight with reference to the earth. But better devised experiments and more accurate observation show that this is not exactly true, and we are driven to the fixed stars as a basis of reference. The trajectories must be straight with regard to these. But even with regard to these the law does not seem to be perfectly accurate. Still we are not obliged to consider the law as merely approximative; for we can define a plane, and points in that plane, so moving with reference to real, *i.e.*, material, points, that the law shall hold true to the extent of all our powers of scientific observation. We will illustrate by supposing that the stars did not shine, and hence were unknown to us, and that we attempted to apply Newton's law to the motion of bodies on the earth. We should find as before that it was not strictly accurate, with reference to the earth, and we should not be able to refer to the stars. We might, however, come to conceive of a plane passing through the poles of the earth and turning about its axis from east to west once a day (*sidereal*), and then we should find that the trajectories of the bodies would be almost exactly straight with regard to this plane. This plane, although imaginary, is rigorously defined with regard to real points on the earth, and other motions used as measures of time. Moreover, the motion would be straight with regard to all planes moved parallel to this plane with a uniform motion.

In this way then we may have to posit and define a plane of reference among the "fixed" stars, a plane not fixed perhaps with regard to any one of those stars, but whose motion is capable of definition with reference to the stars. With regard to this we may assume Newton's law perfectly accurate, but we must bear in mind that, if there is one, there is an infinite number of such planes, *i.e.*, all those moving uniformly parallel with that one which we happen to select.

We now pass to what Professor Maxwell says about the motion of the earth. On page 87 we read:—

"So far as regards the geometrical configuration of the earth and the heavenly bodies, it is evidently all the same

'Whether the sun predominant in heaven
Rise on the earth, or earth rise on the sun,' &c., &c.

The distances between the bodies composing the universe, whether celestial or terrestrial, and the angles between the lines joining them, are all that can be ascertained without an appeal to dynamical principles, and these will not be affected if any motion of rotation of the whole system, similar to that of a rigid body about an axis, is combined with the actual motion. So that, from a geometrical point of view, the Copernican system, according to which the earth rotates, has no advantage, except that of simplicity, over that in which the earth is supposed to be at rest, and the apparent motions of the heavenly bodies to be their absolute (*sic*) motions."

After what has been said, and won our assent, to the effect that motion and rest are conditions of relations between bodies and nothing more than this, and as these relations are merely those referred to in the passage just quoted, lines and angles, as being the same under either hypothesis, we are unable to see any difference between the Copernican and Ptolemaic theory as far as regards the real things which those theories regard. But it is evident that the phenomena might be modelled, and the models conceived in one way or the other, and it may be readily admitted that one way of making the orreries, or drawing the figures, or conceiving of the phenomena in miniature, might be practically more convenient than the other. When the phenomena are thus modelled or figured in imagination the difference between the two conceptions lies in the difference between the relations, of rest or motion, between the images of the astronomical bodies and the room or our own persons. But, as we have said before, these relations do not repeat any astronomical relations. While, then, the difference is a difference only in the scaffolding, it by no means follows that the results of the improvement in this would be inconsiderable as regards our real knowledge. Indeed they have been marvellous.

The word "absolute" appears in the foregoing quotation, and the implication is that in the one view the earth, in the other the stars, are "absolutely" at rest. To decide between them an appeal is made to dynamical laws. Inasmuch, however, as these dynamical laws are generalisations of modes of change of configuration of material systems, and as these changes have nothing absolute in the sense of non-relative in them, it is evident that the dynamical laws can have no reference to anything absolute in that sense—its ordinary sense. It remains then to discover what meaning is to be given to the word "absolute" in order that the statement of the earth's absolute rotation may be, we will not say true, but intelligible. Evidently from the appeal to dynamics, this meaning must have reference to some dynamical law.

We will see what Professor Maxwell refers us to. "Newton," he says, page 88, "was the first to point out that the absolute motion of the earth might be demonstrated by experiments on the rotation of a material system," and he goes on with some experiments on the development of centrifugal force by rotation, and concludes with Foucault's pendulum-experiment. Now the centrifugal force is a

mere case of Newton's first law, and Foucault's experiment is another, a little more complicated. Newton's law was with regard to uniform motion in straight lines with reference to a plane (or other body of points) defined in such and such a way. The plane in which the pendulum, situated at the poles, vibrates must be at rest with regard to this plane of reference implied in Newton's law. The earth, rotating then with regard to the plane of Foucault's pendulum, rotates with regard to the plane of reference once in twenty-four hours. But the earth is said to rotate absolutely once in twenty-four hours, and it is only proved that it does so by showing that it rotates with regard to the plane of reference; therefore all that it means is that it rotates with respect to the plane of reference. "Absolute" motion then means motion with regard to a plane (or other body of points) with regard to which uninfluenced motion is in straight lines. Since, however, uninfluenced motion is in straight lines with regard to an infinite number of planes (or other bodies of points) moving parallel each to itself with a uniform motion, it may seem trivial to distinguish one of these planes from all the others, but a change of *direction* with regard to any of these planes is a change of direction with regard to them all. We may thus speak of rotation with regard to all the planes or a *change* of velocity with regard to them all, while the motion itself, not the change of motion, at any instant is something different for each one of these planes. To this we may then refuse to assign a value, for it might be, or rather is, every value. But the direction or change of velocity of the motion is the same for all of these planes of reference, and to these we may give the name "absolute". It is perhaps to be regretted that the same word has these two different meanings, the one non-relative, and the other the technical and peculiar meaning which we have described. But so it is and the technical meaning is too different from the ordinary meaning to be at all comparable with it.

It is hardly necessary to state that the Ptolemaic did not differ from the Copernican system by asserting that the earth was at rest with regard to a plane with reference to which uninfluenced motion was in straight lines. But it is easy to see how the Copernican conception was much better adapted to conceiving the dynamics of astronomy than the Ptolemaic. The models on the former system would have made the directions which the planets tended to take straight lines with regard to the room, and hence coincident with the directions which the miniature spheres of the orrery would actually take if they were free, while, on the other plan, the bodies would have to describe complex curves in the room. This is the grand advantage in the Copernican conception, but, we need hardly say again, it is one of mere subjective logical convenience.

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MR. G. S. HALL ON THE PERCEPTION OF COLOUR.

MR. G. STANLEY HALL has an interesting though somewhat speculative paper on this subject in the *Proceedings of the American Academy of Arts and Sciences*, Vol. III., p. 402 (1878). Purkinje, Helmholtz, and others had noted that if two parallel fibres of spider's web be brought very close together on a white ground the intermediate white line, when closely examined with one eye, presents a beaded or zigzag outline. This phenomenon is explained by assuming that the retinal image of such a line, falling across a row of cones presumably arranged in alternate order (thus—: : : : :), would only excite activity in one cone, where it fell centrally, yet would excite activity in halves of two adjacent cones, where it fell peripherally, and would accordingly be cognised as twice as large in the latter case. Now, if it be true that the ultimate percipient elements are cones of three varieties, corresponding to the colours red, green, and blue-violet, it would follow that the individual cones which perceive any one of these colours, say green, must be much more widely dispersed over the retina, being at best only about one-third of the whole number. Hence, with black lines on a green ground, or *vice versa*, the beaded irregularity ought to be much greater than in the case of white light, which would excite all three orders of cones.

To test this, Mr. Hall gummed ultimate fibres of silk—white, red, green, blue, and violet—on a piece of black paper. It was found that the wavy outlines were certainly not more, and apparently even less, observable in the coloured than in the white fibres. Hence, if the cause assigned to the beading be correct, it would seem that the hypothesis of three orders of cones must be abandoned. Accordingly, the author suggests that each cone may very probably be percipient of light of all three orders, but of each in a different plane. He supposes that minute segments or layers of the cone may vibrate sympathetically in unison with light-undulations of a particular frequency. To test this view, observations were made on positive after-images. Squares of coloured paper were fastened to a strip of pasteboard, and a movable slit allowed any colour to be seen by itself, without effects of contrast. Positive after-images were formed, first, by rapidly opening and shutting the eyes some eight or ten times, at the rate of once a second; and afterwards by illuminating the squares with the electric spark. A solar spectrum was also similarly observed with a movable slit. With colours near the middle of the spectrum, the first phase of the after-image is nearly or quite white. But red and violet undergo no such paling. In the after-image of a short total spectrum, the middle still seemed nearly or quite white. Even when thrown upon red and violet paper, which by absorbing most of the green rays got rid of the greater intensity of the middle, the effect was still the same.

Mr. Hall suggests the following possible explanation. Let us assume that the cones are composed of transverse disks, each answering, say by sympathetic vibration, to the action of light-waves of corresponding periods. Then the perception of white light would

require the simultaneous agitation of most or all of these disks. Again, let us assume these disks to be arranged in spectral order—those sensitive to red near the point of the cone, those answering to violet near its base—each disk being “transparent” (*i.e.*, non-absorbent) to all waves of greater length than its natural period. Then agitation of a group of medial disks might be mechanically communicated to the groups on either side, and the wave of disturbance so aroused, passing to both ends of the series, would set up a sensation of white; while the agitation of either end would not produce the same general disturbance. Furthermore, pressure (mechanical or from congestion) often causes pure coloured as well as white images. This effect, unexplained on the hypothesis of three sets of cones, is explicable on the new hypothesis, if we assume that increasing degrees of pressure excite waves of disturbance of increasing length. The facts of red-blindness (true Daltonism) are also explained by supposing that the exposed ends of the cones, among the coarse pigment-cells of the choroid, are those perceptive of red; and it might be expected that the cone-ends would be often injured or undeveloped, as indeed the microscopist frequently finds them. [Actual post-mortem observations on the retinas of known red-blind persons would here be valuable.] The sudden decrease in saturation on mixing two tones of green, and the comparative paucity of distinct hues of green, considering the total length occupied by that colour upon the spectrum, are accounted for by the instability which the green-percipient disks would possess, owing to their central position and the ready way in which a wave of disturbance, originated in them and passing each way, would produce the impression of an admixture of white light. The sympathetic function at the centre of the cones would thus be less specialised than at either end. The paper concludes by a discussion of the bearing which late observations on the “retinal purple” would have upon the new theory, and by some notice of its connexion with various other modern hypotheses. The author modestly puts forward his ingenious suggestions in the most tentative form; and further facts or elucidations in the light of his *aperçu* would be valuable. Its relation to the subject of so-called colour-blindness in particular would seem to merit the attention of specialists.

GRANT ALLEN.

PROFESSOR HERZEN ON “THE PHYSICAL LAW OF CONSCIOUSNESS”.

THE following is an abstract of a memoir by Professor Herzen of Florence, which has been read at the Accademia dei Lincei in Rome on Jan. the 5th, and will appear in the next volume of the *Proceedings* of the Lincei:—

“After having pointed out the fundamental principles of modern Monism, according to which, in the organic as in the inorganic sphere, the words ‘force’ and ‘matter’ do not stand for two entities that either work together or are in conflict with one another, but for mental abstractions answering to the two aspects, material and dynamical, of any phenomenon, or to diverse manifestations of an unique substance, whose absolute

nature remains unknowable for us,—the author proceeds to treat of the thorough disagreement that exists amongst the most eminent monistic psycho-physiologists on the subject of the participation of consciousness in central nervous activity. Whilst all admit that there is no essential difference between the activity of the encephalic and that of the spinal nervous centres, yet some hold that consciousness is merely a phenomenon frequently concomitant with, but not necessary to, the activity of all nervous centres, *which can act equally well without it*; other thinkers hold, on the contrary, that consciousness *constantly* accompanies the activity of every nervous centre. G. H. Lewes and Dr. Maudsley are typical champions of these two rival opinions in the field of modern English psychology.

“According to the author, both of these opinions are at once true and false—true, in so far as each starts from one of the two aspects of psychical activity, false in so far as each neglects too much the aspect that forms the point of departure of the rival theory; so that each, in consequence of this neglect, after having grazed the truth, fails to grasp it. He believes that the truth is to be found in the synthesis of the two rival opinions, which synthesis it has been his endeavour to effect; and he proposes, under the name of ‘physical law of consciousness,’ a formula that embraces every act of any nervous centre, encephalic or spinal, from the most intensely conscious of intellectual acts, down to the most unconsciously automatic of reflex movements.

“Starting from the point of view of absolute Monism, he contends that a psychical act, objectively considered, is a special molecular movement induced in the central nervous elements either by an impression from without, conveyed to them by afferent nerves, or by a reflex sensation (from within): it does not become ‘psychical’ until the molecular vibrations in question have been communicated to some cell of the grey matter, and it ceases to be psychical the moment the vibrations cease, or quit the cell to pass into efferent nerve-fibres and be discharged in the shape of muscular movement. The phenomenon taken in its totality presents the following two phases:—First, decomposition of the substance of the nervous elements, and liberation of the latent energy stored up in them, or of the work represented by it; secondly, reconstitution of their substance and storing up of latent energy destined to furnish future discharges. The author calls the first, *nervo-psychical disintegration*; the second, *nervo-psychical re-integration*. Re-integration always takes place according to a mode determined by the mode of the disintegration that preceded it; so that after its functional disintegration the nervous element, originally integrated according to the evolutionary type of the animal to which it belongs, does not return to the state it was in before discharge, but acquires a disposition that enables it to discharge with increased facility along the lines of precedent discharges. This is, in fact, a necessary condition of the evolution or progressive development of brain or mind.

“The author, having premised these considerations, which he deems demonstrated by modern biological research, formulates as follows his ‘physical law of consciousness’:—

Consciousness never accompanies either the integration or the re-integration of the nervous elements; it only accompanies their functional disintegration; its intensity is directly as the intensity of the disintegration and inversely as the readiness with which the internal energy of the nervous element is discharged upon some other element, sensitive or motor, central or peripheral.

“After bringing forward various objective and subjective data of observation in support of this law, in so far as it regards the activities of the cortical centres of the cerebral hemispheres, the author proceeds to show

that it applies equally well to the activities of the sensori-motor centres of the base of the brain, and, finally, to those of the spinal centres. His exposition leads to the result that, whilst the habit of continual and uniform reaction against uniform impressions has ended in the reduction of the medulla spinalis of the higher vertebrates to a condition of complete automatism,—as regards sensorial centres, the variety of impressions received by them, and the resulting diversity of motor and other reactions, have prevented their reduction to a like state of automatism. In the cortical centres, the constant variety, progress, and complexity of their functions, render impossible the reduction of their activities to the state of automatism; unless, indeed, there exist a limit beyond which psychical development cannot pass. If such a limit exist, there must come a day, distant though we must hope it be, in which the psychical activity of the human brain will have exhausted all its possibilities of further evolution, and become little by little instinctive, reflex, automatic, mechanical, such as has already become that of animals whose poorer organisation contained fewer possibilities of development.

"The author believes that his law is applicable to every functional act of any nervous centre; and it unites in a conciliatory synthesis the opposite opinions of Lewes and of Maudsley, by showing that the former, preoccupied with the phase of disintegration in *nervo-psychical* processes, sees consciousness everywhere; whilst the latter, preoccupied with the phase of re-integration, everywhere sees unconsciousness."

VIII.—CRITICAL NOTICES.

Hume. By Professor HUXLEY. ('English Men of Letters Series,' edited by John Morley.) London: Macmillan, 1879. Pp. 208.

This short account by a man of science of one who was more than a man of letters presents some notable features. The biographical part, consisting of forty-four pages in all, is less detailed than could be wished or might have been expected: still the author, with characteristic art, has managed to convey by a few firm strokes a very distinct impression of the manner of man that Hume was; and, few as the pages are, they yet include well-selected representative extracts not only from Hume's charming correspondence but also from the more popular of his essays. He is thus not inadequately portrayed on most of his sides; nor are his foibles and prejudices by any means forgotten in the general picture that is given of placid strength of mind and character. In particular, the reader may carry away from the sketch the essentially true impression of Hume's philosophical activity—that here was a man fitted as few have ever been to sound all the deepest questions of human concern, yet withal one who did not live for that kind of work. The precocious development of Hume's speculative ardour was followed by its contented repression in mature years; while his striving after momentary effect and personal distinction is visible alike in the more than candid self-exposure of his earlier philosophical manner and, when that failed of the mark, in the polished reserve and studied inuendo of his later. Prof. Huxley

makes no pretence that he is dealing with one of the loftier spirits of the race. But if there is one man more than another whose thinking has to be reckoned with in these days, it is Hume, and, such as it is, it can have no more fitting interpreter than a man of science.

Though he shows his sense of its exceeding importance by giving to the Philosophy more than three-fourths of the whole space at his command, Prof. Huxley does not of course aim at producing a balanced exposition of the whole. When he has traced Hume's account of the origin of knowledge up to the point when the generalising and objectifying agency of Language comes into play in the form of propositions, he is forced to confine himself to those philosophical topics that are of more general interest to mankind, and which, probably on that account, were those that continued to engage Hume's own thoughts after the wider-ranging activity of his youthful intellect was spent. Upon such subjects as Miracles in relation to the Order of Nature, the Soul, Theism, &c., Hume's ideas get, in some eighty pages, that sympathetic exposition, mixed with vigorous and independent criticism, that were to be expected from his present interpreter. In this place, however, we may rather note a few points in Prof. Huxley's treatment of the foundations of Hume's philosophy, which he has sought to repair and make good in the light of more advanced knowledge.

He would amend the scheme of the sources of knowledge by adding to Hume's enumeration of the senses "the muscular sense, which had not come into view in Hume's time"; by extruding the passions or emotions (Hume's so-called 'impressions of reflection') as being all of them "complex states arising from the close association of ideas of pleasure and pain with other ideas"; but, chiefly, by positing "as ultimate irresolvable facts of conscious experience" three feelings or "impressions of relation," namely, co-existence, succession, similarity and dissimilarity. He is, of course, perplexed by Hume's unaccountable wavering in the matter of Relations, and sees the need of making a clear and decisive affirmation on this all-important head; but, whatever may be said against Hume's uncertain enumeration of the formal elements, it would not be easy for Prof. Huxley to prove his own sufficient for the explanation of knowledge as exhibited by any human mind. Nor is his statement of the material elements up to the mark of modern psychological science when he is content, under the head of Sensations, to add to the usual five senses "Resistance (the muscular sense)," and makes "Pleasure and Pain" a co-ordinate chief head. Impressions (1) of Sensation, (2) of Pleasure and Pain, (3) of Relations (as above)—are hardly an adequate scheme of the "Contents of the Mind".

How the impressions arise or come to pass in consciousness is the next question dealt with, and here Prof. Huxley, while noting again a want of decision in Hume's answers, due (as he thinks) partly to his apparent unfamiliarity with even such knowledge of the physiological conditions of consciousness as was then current, declares for himself "that the materials of consciousness are products of cerebral activity,"

"effects or products of material phenomena," or, as he says more explicitly in another connexion, "products of the inherent properties of the thinking organ, in which they lie potentially, before they are called into existence by their appropriate causes". In calling them, however, effects of material phenomena, he is careful to explain that he means nothing inconsistent with the idealistic position—"that whenever those states of consciousness which we call sensation or emotion or thought come into existence, complete investigation will show good reason for the belief that they are preceded by those other phenomena of consciousness to which we give the names of matter and motion". And whether these phenomena, in the last resort, are due to the evolution of the mind as a "Leibnitzian monad or Fichtean world generating-ego," or are symbols (not copies) of "a real something" in relation with "the part of that something which we call the nervous system"—are two suppositions which, in his view, are equally possible in themselves and equally beyond the possibility of being either of them exclusively established.

There is some very striking expression, on p. 81, in the short development of this view, but the author seems open to the charge of not keeping sufficiently apart two different kinds of consideration. There is, of course, a good meaning in saying that sensations arise when certain changes are effected in the nervous system, and, in this point of view, do not arise without such antecedents or (more strictly) accompaniments. There is also a good meaning in saying that the physiological accompaniments have themselves an expression in terms of conscious experience, and, from this higher point of view, cannot be allowed to be the absolute conditions of mind which the materialists suppose. But what is of chief importance is that the two points of view should be clearly severed, and this they hardly are when it is said that the phenomena of sensation, &c., are, in the "idealistic" point of view, to be regarded as "preceded by those other phenomena of consciousness to which we give the names matter and motion". From the idealistic, which is the philosophical, point of view, there is in truth no question of a relation of sensation or other subjective experience to anything that is ever called matter and motion. When we speak of such a relation, we are at the other point of view—the point of view of positive science. The question of the "origin" of states of consciousness is, in fact, an ambiguous one; and this, it may be added, makes it especially important in describing their physical relations, which is one question, not to speak of them as "products" or "effects" of nervous processes, when such terms, if at all strictly interpreted, must be held to exclude, or at all events prejudice, the other, or philosophical, question. It is possible that Hume refrained from such a statement as Professor Huxley offers less from ignorance of such physiology as was accessible to him than because he remembered that he was engaged upon a philosophical inquiry.

On the historic question of Innate Ideas so lightly skimmed over by Hume, Professor Huxley takes occasion to quote some passages from Descartes' minor writings, which should be noted by students of the

history of philosophy as showing how circumspect that thinker could be, when he chose, in his statement of the relation of reason to experience in knowledge. More particularly, they prove him to have clearly anticipated the kind of answer which Leibnitz, in the *Nouveaux Essais*, takes, and usually gets, the credit of having made to the arguments of Locke. In comparison with Descartes, Hume is rightly charged by his critic with an imperfect appreciation of the import of the question and an inadequate resolution of it.

Rightly, too (as I think)—to refer but to one other point of the detailed exposition—does Professor Huxley, when dealing with Hume's account of "Abstract Ideas," in relation to language, lay stress on the different cases of concepts, as they stand related or not to definite percepts. While highly abstract qualities of things or relations amongst things may safely be pronounced unthinkable without the help of definite marks and signs, it has been too readily assumed by nominalists that the corresponding words are in like manner indispensable to the mind's comprehension of sensible objects. In spite of what Berkeley, once for all, so triumphantly urged against the easy-going assumption of conceptualist thinkers—that there is no more difficulty in the definite representation of generals than of singulars, the circumstances in which concepts are formed are in fact so different as to preclude the possibility of making any hard and fast statement as to the representability or non-representability of generals. When definite percepts are experienced with well-marked common features overpowering individual differences, it is quite intelligible, according to psychological law, that there should arise representatively some *schema* more or less definite which for purposes of (general) thought may stand for the multitude of singulars. This seems to be the view that Prof. Huxley seeks to express in less technical language, and in illustration he very happily refers to Mr. Galton's production of the typical face of a class by superposition of portraits of similar individuals on the same photographic plate.

The earlier chapter on "The Object and Scope of Philosophy," with which Prof. Huxley passes to the second and more serious part of his task, deserves, in conclusion, to be still more particularly noted. Though it may not contain anything that is unfamiliar to philosophical students, it is really, for its length, a very good statement of the meaning of philosophy in relation to the sciences and also, more especially, of the relation of philosophy to psychology. Taking Kant's famous statement of the business of Philosophy—that it answers the three questions: "What can I know?" "What ought I to do?" and "For what may I hope?" and bringing back the last two questions to the first, he proceeds to maintain that, while that question is distinct from the question of Science or the Sciences: "What do I know?" it can be answered, in its different bearings, only by reference to the results of one branch of science, namely Psychology, which investigates the actual contents of the mind. Here are some of his sentences, bearing on the question of the scientific standing of Psychology:—

"Psychology is a part of the science of life or biology, which differs from the other branches of that science merely in so far as it deals with the psychical, instead of the physical, phenomena of life. As there is an anatomy of the body, so there is an anatomy of the mind: the psychologist dissects mental phenomena into elementary states of consciousness as the anatomist resolves limbs into tissues and tissues into cells. . . . As the physiologist inquires into the way in which the so-called 'functions' of the body are performed, so the psychologist studies the so-called 'faculties' of the mind. . . . On whatever ground we term physiology science, psychology is entitled to the same appellation."

Nothing, again, could be more pointed than his rejection of Comte's plea against the possibility of mental introspection; and when Hume himself—in the remarkable passage of the Introduction to the *Human Nature*, where he argues for an extension of the area of psychological observation to the broader field of human social activity—seems for a moment to anticipate Comte's view in a more guarded form, Professor Huxley is immediately ready with the very pertinent remark that "the manner in which Hume constantly refers to the observation of the contents and the processes of his own mind clearly shows that he has here inadvertently overstated the case." It is refreshing to come across one "man of science"—and him a leader among his fellows—who can enter so sympathetically and thoroughly into the conditions of psychological inquiry; and it may be hoped that his words will not fall idly upon ears that are deaf to voices from within the psychological camp itself. Professor Huxley's appreciation of the scientific character of Psychology contrasts very favourably with the different opinion—specious but hollow—to which Professor Clerk Maxwell has lately committed himself in a bright review of a dull book (see *Nature* December 19, 1878).

EDITOR.

Habit and Intelligence: A Series of Essays on the Laws of Life and Mind. By JOSEPH JOHN MURPHY. Second edition, illustrated, thoroughly revised and mostly re-written. London: Macmillan & Co. 1879. Pp. xl, 583.

Mr. Murphy has republished his work on organic and mental evolution in one volume, with so many alterations that, as he justly claims, it may be practically regarded almost as a new book. The Introduction to the first edition, consisting of an essay on historical methods in science, has been suppressed: while the Preface to the first edition does duty as Introduction to the present issue. All the chapters dealing with physical science, all the *résumés* of facts bearing on evolution, together with the chapter on the Senses, and the three chapters on the Classification, the History and the Logic of the Sciences, have also been omitted, "to avoid making the work too bulky with material which is not directly relevant to its main subject". On the other hand, several new chapters have been inserted, which may conveniently be summed up under two heads. First come three

chapters on the Facts of Variation, on the Effect of Change of Conditions, and on Mimicry, Colour and Sexual Selection. These consist mainly of short summaries, giving the gist of such among Darwin's great works as have appeared since the publication of Mr. Murphy's first edition, together with a few excerpts from Mr. Wallace, Professor Mivart and the current scientific periodicals. Secondly, the purely new constructive matter of the edition is contained in five chapters on Classification and Parallel Variation; Classification and the Fixation of Characters; Structure in Anticipation of Function; the Origin of Man; and Automatism. "The chapter on Metamorphosis and Metagenesis is mostly new. The psychological chapters are re-written and much improved; and there are few chapters which are not in a considerable degree re-written." In short, the alterations and additions bring the author's original conception (with few exceptions) up to the level of the most modern discoveries and theories.

It will be obvious from the above summary that very little of the fresh matter comes strictly within the domain of MIND. Nevertheless the subjects of which the new essays treat have so many close relations both to Psychology and to Philosophy, that some short account of their contents may not be undesirable here.

The chapter on the Facts of Variation is a brief review of Mr. Darwin's *Variation of Animals and Plants under Domestication*, and adds little or nothing to the existing stock of knowledge on the subject. That on Classification and Parallel Variation endeavours to show, after Professors Cope and Mivart, that "transverse affinities" exist between the species of different genera; that is to say, that certain species of each genus answer to certain species of other genera—a system which may best be illustrated after Mr. Murphy's own manner as follows, where A, B and C stand for genera and 1, 2 and 3 for species. The transverse affinities will then be seen thus:

A ¹ ,	A ² ,	A ³ .
B ¹ ,	B ² ,	B ³ .
C ¹ ,	C ² ,	C ³ .

These supposed facts of Parallel Variation seem to Professor Cope and Mr. Murphy inconsistent with the belief that organic evolution is mainly or entirely due to natural selection. But the cases alleged in defence of the theory seem ridiculously inadequate to support so weighty a conclusion. If we must bring in a *deus ex machina* to account for such occasional parallelisms, we ought at least to be shown a *dignus vindice nodus*: whereas the system as propounded by Mr. Murphy looks to an outside observer quite as fanciful as the *quinary classifications* of earlier biologists. Where the habits of life are similar we should expect direct and indirect adaptation to produce great similarities of structure in very different animals or plants, as in the humming-birds and sun-birds, the cetacea and fishes, or the euphorbias and cacti. Indeed, Mr. Murphy himself makes so many admissions upon this point, as well as upon the influence of correlation of characters, that he practically answers his own arguments.

The chapter on Classification and Fixation of Characters endeavours

to prove that natural selection will not account for the relative fixity of unimportant specific characters. But, waiving the question whether any such relative fixity really exists (a point upon which a certain amount of incredulity may be felt; for any man who has specially studied a small group of species—say, for example, the British snails—must have been struck by the infinite number of varieties and individual peculiarities), let us take the particular case which Mr. Murphy alleges—the arrangement of the parts of the flower in plants. Now this, it might seem to many, is *not* an unimportant character, from the functional point of view, but is rather a matter of prime importance, as influencing the proper fertilisation of the pistil. And even if it were not so, would not constant crossing (as I have endeavoured to show elsewhere) necessarily result in a relative uniformity and definiteness by neutralising individual peculiarities, as, for example, in the shape of bones inherited from remote ancestors, as much as in mere spots or lines of colour? And are we ever sure that any character, however apparently useless, is really so? Do not works like Darwin's *Fertilisation of Orchids* and Kerner's *Flowers and their Unbidden Guests* teach us from day to day that some unseen purpose lurks in the most insignificant detail of every plant and every animal? We ought at least to make perfectly sure that we know *all about* a particular character before we dogmatically assert that it is functionally useless. But even if we grant Mr. Murphy's argument all possible licence, it would still seem that comparatively functionless structures, handed down from an immense number of ancestors, ought above all others to be kept constant by neutralisation of individual variations.

The chapter on Mimicry, Colour, and Sexual Selection contains a short summary of Darwin's and Wallace's views on these subjects. But Mr. Murphy does not seem to be acquainted with Sir John Lubbock's researches upon the optical perceptions of insects, as he refers to a much less conclusive observation on the spectrum of the firefly's light: and if he had consulted Mr. Wallace's *Tropical Nature* (pp. 189 ff.) he would probably have modified his remarks with regard to the difficulty of understanding how the first steps in mimetic resemblance are taken, though his application of the principle of "local resemblance" to these cases certainly deserves consideration for its ingenuity. Mr. Murphy seems overmuch inclined, also, to use the word "beauty" in too limited and human a sense. For example, he observes that gasteropods "certainly have not a mental nature sufficiently developed to appreciate beauty," and therefore he argues that the colours of their shells cannot be due to sexual selection. But surely it is going rather far to talk of "mental nature" and "appreciation of beauty" in connexion with so simple a taste as that for bright colour. It may well be doubted whether any gasteropods (except possibly the strombidæ) have eyes sufficiently developed to distinguish colours: but, granting this, there seems no reason why they should not be attracted by bright hues as readily as any higher species. At any rate, it is certain that gasteropods can perceive light, and are

attracted by it in the same manner as insects. If, therefore, they do not receive pleasure from the stimulation of colour, it is probably because they are unable to perceive it.

The most striking chapter in the whole book, however, is that which deals with Structure in Anticipation of Function. It cannot be denied that Mr. Murphy has here got hold of the great *crux* which evolutionists have hitherto failed to solve. Of course the difficulty has struck every Darwinian already: but Mr. Murphy uses it with much force, not as a mere friendly suggestion, but as a weapon of hostile import. No doubt the origin of certain structures, such as the mammary glands or the wings of birds, is exceedingly difficult to understand: because it is hard to see how they could be of any use to the animal until they had reached a considerable degree of development. But it is too much to say dogmatically of the rudimentary notochord in the ascidian larva (to take a concrete instance) that no "possible benefit to the animal itself will account for it". From this and similar examples the author draws the conclusion that "as there is Foresight in organic development, there must be Intelligence". This intelligence is seen in the evolution of the crustacea, which cannot be explained (it is asserted) by the action of the environment on the organism; in the metamorphoses of medusæ; in the transition from fishes to air-breathers; and in the "preparations for bird-structure" in the dinosaurians. In all these instances it might be wiser to acknowledge our ignorance of the real course of evolution than to call in an unknown agent to account for half-known facts.

Finally, the chapter on the Origin of Man takes up, with like intent, Mr. Wallace's view that natural selection is inadequate to explain the evolution of the human brain, because primitive man is supposed to have had a brain developed beyond his actual attainments. If we remember, however, the important principle pointed out by Mr. Herbert Spencer, that brain is proportionate to the complexity of the muscular movements performed, as well as to their number, it will appear that the central nervous system of primitive man—a talker, an instrument maker, an artist, a hunter, a fisherman, and a warrior—is really *not* more than that required by his actual attainments, which are so infinitely more varied than those of the highest anthropoid ape. Mr. Murphy himself almost allows as much, for he says that language alone may be sufficient to account for the difference—a very questionable statement, as it seems to me. But he then goes on to say that this only removes the difficulty one step back, as language itself is developed among savages far beyond the needs of their actual life. It is curious that practical researches into several special vocabularies have led more than one observer to the diametrically opposite conclusion,—that language is only developed in exact proportion to the needs of its users. From these and other alleged facts, Mr. Murphy, like Mr. Wallace, deduces the belief that an Intelligence has presided over the development of man. But while Mr. Wallace seems to believe that the Intelligence supervened, so to speak, at a late date, and need only be invoked after the appear-

ance of the quadrumana to account for the special peculiarities of mankind, Mr. Murphy thinks that Intelligence has guided the whole course of organic evolution, from the root upward. Again, while the former author regards this Intelligence apparently as external to the organism, the latter considers it as immanent. The phrase "unconscious intelligence" which he applies to its lower forms might even remind one of Von Hartmann. On the other hand, Mr. Murphy disclaims the imputation of pantheism, and seems to consider himself a theist, though on this point he speaks with apparent reserve. The new edition leaves us as much in the dark as to the nature of the immanent Intelligence as did the former one (if not even more so): and it must be confessed that the reader lays down the book with no very clear conception of its ultimate intention.

On the whole *Habit and Intelligence*, now as before, represents that class of beliefs which form convenient resting-places between two theories, the old and the new. At bottom it is a compromise, a reconciliation between evolution and design. Like most other reconciliations, it will doubtless satisfy for a while a certain number of timid and inquiring minds, just as Hugh Miller's reconciliation of geology and Genesis satisfied similar spirits in a past generation. But Mr. Murphy is too conspicuously candid, honest and manly for a good apologist. He admits too much and allows the strong points of his adversaries too easily. The new chapters state with great clearness the principal difficulties in the way of accepting natural selection as the sole cause of organic progress: but they also state with too great emphasis the reasons for not regarding these difficulties as final.

GRANT ALLEN.

Phänomenologie des sittlichen Bewusstseins. Prolegomena zu jeder künftigen Ethik. Von EDUARD VON HARTMANN. Berlin: Duncker, 1879. Pp. xxiv. 871.

It was in 1869 that Von Hartmann took the reading world of Germany by storm by the publication of his *Philosophy of the Unconscious*. Since then edition has rapidly followed edition (the most recent being the 8th, published last year, in two volumes), and its author has sent forth at short intervals other striking compositions from his productive workshop. Now, to show that the creative energy is still unspent, we have a freshly-written volume of 870 pages on a department of thought hitherto neglected by him. This last performance will hardly have the success of the *Philosophy of the Unconscious*, lacking the charm of a novel theme and that audacity of imagination which characterised the earlier work; but it is marked by an originality of treatment and artistic completeness somewhat unusual in a treatise on morals. Von Hartmann, as is well known, possesses in a high degree the ability to write for the general public without being superficial, the power of handling the profoundest themes of thought and life without incurring the

reproach of learned dulness. He always refuses to look through other people's spectacles, and accordingly makes the reader feel that the problems he is dealing with are really personal problems, not merely abstract questions to be debated in the schools as matter of speculative curiosity. But again, our author is anything but a merely "popular" thinker in the sense that he carries the discussion just far enough to satisfy the demands of common sense. On the contrary he has perhaps an inordinate desire to probe things always to their very bottom, and is never satisfied unless he has carried to its extreme consequence the principle he finds himself logically necessitated to accept. Thus, in the present book, although it is called, and is for the most part, a *Phenomenology*, or examination of moral phenomena, he cannot refrain from adding a third section on the *Urgrund* of morality or an account of *absolute* moral principles. I mention this merely as a characteristic of the author, without pronouncing on its wisdom or unwisdom. The English mind tends to err (if error it be) too much on the other side for a reader not to feel a shock of pleasant surprise when he takes up a book, professedly addressed to the world at large, which considers a final metaphysic indispensable to the regulation of the commonest life.

Before entering upon his main task, namely, an examination of the genuine moral consciousness, Von Hartmann devotes about a hundred pages to a consideration of Pseudo-morality, or those principles on which the human mind first relied to guide its action, and which, though really non-moral, were a necessary propaedeutic to the rise of a true moral consciousness. These pseudo-moral principles are Egoism and Heteronomy—the principles of Self-Love and External Authority. In the main these correspond with the principles of Antiquity and the Middle Ages, at least so far as the Greek and Scholastic philosophies are concerned. It was the well-being of the *individual* which Greek (and Roman) Ethics always assumed to be the final court of appeal in matters of conduct, whether that well-being was positive or negative pleasure, or the negation of pleasure in the form of apathy or indifferentism. The natural mind has no doubt with regard to the attainability of happiness, and the sympathies are for a long time too weak to allow of any regard for the happiness of others, except as an enforced limitation to the demands of self-love. But this *naïve* belief in the attainability of private happiness cannot last. The hindrances to personal enjoyments are far too many for any one living in the busy world, subjected to restraints on every hand, to imagine that Individual Eudaemonism is terrestrially realisable. Despairing of happiness *here*, the individualist throws his glance beyond the confines of earth, and fondly imagines blessedness *there*. This transcendent eudaemonism is exhibited in the ethics of the early Christians, but in that form is no more capable of satisfying the requirements of the moral consciousness, than terrestrial egoism. For, the social continuity being interrupted by death, everything that is most precious here being unknown there, there is no support given to just those forms of activity which are the most prominent in earthly

life. A transcendent egoism, moreover, which finds its moral norm in the principle: That is right which will lead to heavenly happiness, needs a revelation of the celestial code, thus paving the way for the next principle of Heteronomy, or External Authority.

He who deliberately makes his own happiness his end is forced to surrender one pleasure after another, in order to retain some chance of happiness at all. And this course continues, until it is at last found that the positive eudaemonism, with which the individual started, has become negative eudaemonism. Hedonism passes into Cynicism. First apathy, then contempt for life. The Stoic's self-renunciation, or moral indifference, passes into utter disgust for every form of earthly action. But there is one step more to take. Life being discovered to be worthless, why consent any longer to bear its daily burden? The choice lies between Suicide and Asceticism. If there be no future life, suicide would be the more rational; if this life be not all, asceticism might be the more prudent course, but only at the cost of rendering continued existence utterly valueless, and thereby rendering it utterly meaningless. Egoism has thus ended by becoming "bankrupt". Its last word is Self-renunciation, denial of the principle itself. But a man who has discovered the vanity of the search for personal pleasure, if he shrinks from the practically logical consequence of his guiding-principle, will only be able to evade that consequence, by surrendering his self-confidence and submitting to an authority outside himself. The Egoist has gained something by the practical discipline of life—he has learned the *necessity of self-renunciation*, and that is the contribution of this pseudo-moral Egoism to the erection of the moral fabric. But there is something more wanted before the human mind can become truly moral: there is the need of an engrained reverence for Law. And that reverence must be gained through obedience to rules authoritatively imposed from without. Von Hartmann briefly reviews the various forms of Heteronomy, the authority of the Family, the State, the Church, the Divine Will, and shows the relative value of each, according to the intellectual elevation of those submitted to the rule; but they cease to be sufficient as soon as the individual regains the self-trust which the failure of his first attempt at self-guidance led him to renounce. Summoning up courage at length to criticise the authorities which profess to offer an infallible help, he discovers that they are only mediately authorities, that they are only to be trusted so far as they repose on right reason and pure feeling. At this stage the heteronomous education is completed, and henceforth the rule of action can only be *autonomous*, the genuine moral consciousness being now born.

We now enter upon the main theme of the book. This second part has three divisions—the Springs of Morality, the Ends of Morality, the Ultimate ground of Morality; the largest space being given to the Springs of Morality. These are the subjective principles of Taste, Feeling, and Reason. The question to be answered first is: Do we instantaneously give expression to feelings and judgments on actions, entirely without regard to their bearing on personal well-

being, or without reference to their conformity with any external code? The answer is that we do, and in a three-fold form. Goodness or badness is implied in our æsthetic judgments, we feel drawn to or repelled from certain modes of conduct, and we peremptorily judge this course to be right and that to be wrong. It should be observed that the question is not here raised as to the genesis of these mental phenomena. The inquiry is one merely of matter of fact, not of psychological origin. It would not be possible in the present notice to review in detail all the forms of the subjective moral principles here described. Under the head of Taste, the author treats of the principles of Harmony, Perfection, and the Ethical Ideal. The justification for taking Taste first is not that it is the more elementary psychical form, yielding in that respect to Feeling; but because it is more independent of the special object-matter, and therefore seems better adapted to lead the mind to acknowledge the reality of subjective morality as a general form of consciousness.

Indispensable as Feeling is as a moral factor, it is an error to found a system on this most subjective of all principles. Love, compassion, even the feeling of duty itself, have a moral value, not in their own right, but only so far as they unconsciously serve an end; in other words, they must be *rationalised* before they can be pronounced ethical. Feeling and Taste are particular and concrete in their application, but the Moral Law is general and abstract; hence Reason must be taken into the account as the third and highest subjective principle. Von Hartmann treats at great length of the rational impulse. A discussion of Moral Freedom leads him to examine fully the Free Will controversy, his conclusion being that the belief is the result of a confusion of self-positing with immediate-positing in willing, and irreconcilable with the fundamental conditions of moral life. The highest form of subjective rationalism is to be found in the idea of purpose or design. The world can only be rationally conceived as a system of graduated ends. Refuse to admit the idea of purpose (*Zweck*), and Morality becomes impossible; for if there be no objective ends on which the subjective principles of autonomy may repose, there is nothing for it but to fall back upon the pseudo-morality of Egoism, or the arbitrary commands of any power which may have strength enough to enforce obedience.

We must pass on then to the objective ends which the subjective principles of Taste, Feeling, and Reason unconsciously imply, and from which they receive their moral character. A man, who has come to perceive the impossibility of setting-up his own happiness as end, will find no difficulty in positing the happiness of others as the proper end of action. Social Eudaemonism is an objective moral end largely recognised, not least in England; John Stuart Mill's essay *On Utilitarianism* being recommended to the inquirer as furnishing the best statement of the doctrine. The recommendation is not very easy to understand, however, because when Hartmann comes to examine the essay critically, he can hardly find language strong enough to express his contempt for its superficiality and confusion of

thought. He holds that Mill either failed to see that Egoistic and Universalistic Hedonism are radically opposed principles; or in order to bribe common sense to accept the severer doctrine, perpetrated the pious fraud of representing the endeavour after other people's happiness as the same thing as furthering one's own. The identity of private and public interest herein implied is phenomenally impossible, individuality necessitating antagonism to the very end of the chapter. The stress laid by Mill on Sympathy, and his demand for a Religion of Humanity, should be regarded as unconscious admissions that a phenomenally objective rule cannot be independent, but on the one hand requires the support of subjective feeling, and on the other points to a deeper ground of Morality in the metaphysical unity of the human race. Suppose, now, the principle of the "greatest happiness of the greatest number" to be erected into an exclusive objective moral end, the consequences would, in the view of our author, be anything but desirable. A serious attempt to maximise happiness would lead to an equality of possessions, the abolition of motives to exertion, the reign of ignorance, and finally a reversion to the most pernicious of all principles—the diffusion of beliefs and illusions for the sake of their agreeableness. Thus, all that the world has so painfully striven for—refinement of life, art, science—would go down in the flood of common-place comfort, tasteless art-products and Jesuitism. One cannot help suspecting that Von Hartmann, like the less-gifted of his countrymen, has been scared by the rapid growth of late years of the party of Social Democrats. Such plausibility as his description of the consequences of Social Eudaemonism possesses, is only obtained by the very *unphilosophic* procedure of ignoring many of the circumstances of the case, the result being a trivial solution of an unreal problem. In considering what is for the happiness of other human beings, the idea of happiness, as conceived by the cultured few, will form a not unimportant element, so that that universal re-animalisation, which our author announces as the social-eudaemonistic goal, would be a simple impossibility. With regard to the degradation of science and art, it is very doubtful whether the best work even now is done as a result of the pressure of competition. Certainly the highest genius is not productive, either through the stress of competition (which does not exist for it), or with an eye to an appreciative public (which is usually at first lacking). But by the time the levelling process contemplated has gone to extreme lengths, we may suppose the love of truth and beauty will be so firmly rooted, that bad art and pleasant fictions will be condemned even by the many.

Besides General Happiness, our author cites another objective principle—the Development of Culture. Allowing Social Eudaemonism full right as a moral principle applicable to an existing generation, the principle of Evolution is needed to supplement it, in view of humanity being a continually growing organism. As the happiness of the individual must often be sacrificed for the welfare of the community, so the interests of an existing society must be made to bend to the well-being of the future of the race. This is a point of view which

has no doubt hitherto been imperfectly adopted. Indeed, it could hardly well be otherwise, seeing that Evolution in the elaborate form of the doctrine as we now know it is so recent. It is, however, probably owing to the slight regard that is paid to the needs of the future, that our books on ethics have such an air of unreality about them, and that so little has yet been done towards a scientific system. Von Hartmann of course lays great stress on this aspect of morality, as his philosophical system as a whole is in effect a Philosophy of Progress, with Teleology as its corner-stone. The pursuit of general happiness now appears in its true light, as means to the awakening of consciousness, wherein consists the *raison d'être* of Humanity. The moral world-order is the complete expression of the two one-sided principles—Social Eudaemonism and Development of Culture. When we severally play our parts in this world conceived as a system of ends, freely surrendering our own welfare, or the welfare of a lower end for the sake of a higher, we are then first truly moral. One thing is clear by this time, that Morality cannot be divorced from theoretic Philosophy. It may be shown most convincingly that man possesses impulses of a social nature, that the pursuit of private pleasure is doomed to disappointment; still it is possible to deny the objective validity of the so-called social principles, and in spite of the failure of Egoistic Hedonism to assert the Absoluteness of the Ego. Von Hartmann rightly calls such a mental condition "the most horrible that can be conceived"; but he avers that to that state we must all come at last, if our view of the world leave no room for an objective Teleology. Phenomenal objective principles hang in the air unless they are based on absolute moral principles which affirm the identity of the essence of the individual with the essence of the absolute. We are driven on to a Metaphysic of Morals, because, on the one hand, the subjective principles can furnish no general rules, and are dependent on the constitution of the individual; on the other, the objective principles, not being *my* principles, have no constraining force. Nor will any mere combination of them suffice; they can only attain their proper influence when the aim of the world is proved to be my aim, and my aim would have no significance unless it were the aim of the whole. The foundation of Morality then is supplied by four principles—the *monistic* principle of the essential identity of individuals, the *religious* principle of essential identity with the absolute, the *absolute* principle of absolute teleology as that of our own essence, the principle of *redemption* (*Erlösung*) or negative absolute-eudaemonism.

The objective principles of right conduct (to which our subjective consciousness pointed) were two—that it was our duty to further the general happiness, and that we were bound to sacrifice the well-being of a lower order of existence for the sake of a higher. The endeavour after the utmost possible happiness through a continual process of self-renunciation—such was found to be the content of right and moral action. But man's life is a fraction of the Universal Life, his purpose is a part of the Universal Purpose. Transfer the notion of Eudaemon-

ism (Happiness) to the Absolute, and regard the world-process, human activity included, as a necessary aid to its attainment, and we have at once Social Eudaemonism and the self-denying principle of Evolution made intelligible. The essence of all is One: that essence is non-blessed. It endeavours after blessedness, an unattainable state, but which can only be so demonstrated, when the absolute essence is illuminated through the full development of consciousness. The author of the *Phenomenology of the Moral Consciousness* is still eloquent in praise of Schopenhauer, and has not receded from the stand-point of the "Metaphysic of the Unconscious". Perfect Duty and true Religion are one—to work to the utmost for the enlightenment of the Absolute Will, and to do that work reverentially and lovingly, feeling that we are labouring to abridge the pains of a God, the term of whose suffering is at the discretion of his creatures. The difference between this theology and that of the Christian Church, for instance, is that we each and all *are* the very God who is awaiting deliverance.

Von Hartmann considers he has now solved all the difficulties in the way of a Theory of Moral Obligation. The challenge, as I understand it, which he throws down to contemporary moralists is—to explain our moral consciousness (1) without basing morality on ontology, and (2) without accepting the ontology which he propounds. He is less concerned for the second point than the first. He thinks his own Pessimism the only metaphysical creed capable of satisfying all the requirements of the problem; but should that opinion prove to be ill-founded, the reasons for a metaphysical support to morality would remain in full force.

W. C. COUPLAND.

ΠΕΠΙ ΔΙΚΑΙΟΣΥΝΗΣ. *The Fifth Book of the Nicomachean Ethics of Aristotle.* Edited for the Syndics of the University Press, by HENRY JACKSON, M.A., Fellow of Trinity College, Cambridge. Cambridge: University Press, 1879. Pp. 125.

The correction of a few oversights in Bekker's text and critical notes—sums up the value of this edition. It is to be regretted, however, in the interest of those students who use Zell and Michelet, that Mr. Jackson has not printed his collation of El. along with that of Bekker's MSS.; for Zell and Michelet derive their knowledge of El. CN. and CCC. entirely from Wilkinson (1715), and an examination of Book V. in CCC. has convinced me that Wilkinson's collation is worse than useless, giving a perfectly false idea of the character of the MS. which closely resembles K^b without being a transcript of it. It is probable that he is as misleading with regard to El.

Mr. Jackson's extensive re-arrangement of the Book is scientifically inadmissible even as an hypothesis, because it cannot be decisively tested. His test, *lucidus ordo*, is not decisive, for the author or ancient editor may have been satisfied with much less order than Mr. Jackson is; and supposing "Dislocations," as he says, to have taken

place, we cannot deal with them after the manner of the editors of Lucretius, by reconstructing an archetypal MS. The attempts at least to reconstruct one have not been of a very promising nature, and Mr. Jackson, I observe, does not notice them. Young students, however, will welcome Mr. Jackson's *lucidus ordo*; and I can imagine nothing more demoralising for them than the feeling that difficulties may be effaced in Mr. Jackson's way. Nor do I think much of Mr. Jackson's order, even as a device in hermeneutic. *E.g.*, his treatment of 6 §§ 1-5 simply obliterates a valuable piece of dialectic. Surely τὸ ἀντιπεπονηθός in § 3 is introduced to show, by reference to a principle which neglects motives, that we must not overlook the προαίρεσις of the agent (§§ 1 and 2), while §§ 4 and 5 analyse τὸ πολιτικὸν δίκαιον and νόμος with the object of showing that we can infer an unjust motive from the acts of the πλεονέκτης at least.

Nowhere can I see in this edition any due appreciation of the general philosophical bearings of Book V.; and the Notes on particular difficulties of interpretation not involving "dislocations" will not help the student who possesses previous editions, if they do not mislead him by their eccentricities. *E.g.*, Mr. Jackson's eccentric treatment of 5 § 9 is rendered unnecessary by the note of Michael Ephesius *ad loc.* to the effect that τὸ ποιῶν is *ex vi termini* the superior producer—"The trades would perish unless, A supplying wares of a superior bulk or quality, B were able to express this superiority (ἐπασχε τοῦτο καὶ τοσοῦτον καὶ τοιοῦτον) in terms of his own inferior wares". On 5 § 12, Mr. Jackson follows old grooves. Although he speaks of "one pair of shoes on account," he fails to see, from the prominence of νόμισμα in the context, that ὅταν ἀλλάξωνται implies the exchange of A's goods for B's money, or rather credit, not the exchange of goods by both parties. The § merely puts the principle stated in *Eth.* IX. i. 9: that the receiver (τὸ ἕτερον ἄκρον, the inferior party) fixes the price, but *before* the goods are delivered. Mr. Jackson's explanation of ἡ κατὰ διάμετρον σύζευξις (5 § 8) has been anticipated by Mansel (*Journ. of Class. and Sac. Philol.* i. 344, 1854). To make τὸ ἀπλῶν δίκαιον (6 § 4) the genus of which τὸ δεσποτικὸν δίκαιον, &c., are species, is to mistake the obvious purport of the context, which states that τὸ δεσπ. &c., do not realise the notion of justice (τὸ πρὸς ἕτερον) at all. Ἀπλῶν is a word with many shades of meaning, and must always be interpreted in relation to its particular context. Mr. Jackson's treatment of it here betrays unfamiliarity with a very important point in Aristotelian usage. The beginner who adopts Mr. Jackson's view here will see the whole Fifth Book in a wrong light. I had marked other Notes for comment, but have no further space. I can only say that where they vary from those of previous editors, they are meagre and eccentric. The import of the book, as an integral part of a great philosophical system, is ignored, and every thing is sacrificed to a hasty and unscientific attempt to mend assumed "dislocations".

One word in conclusion on Mr. Jackson's "translation or paraphrase". I do not think that he gains "precision and perspicuity"

by leaving in Greek all the technical words and formulæ. I should have thought that the rendering into English of such words and phrases, in an author like the present, was the only way to put one's precision and perspicuity of thought to the test. Aristotelian scholarship in England is happily too familiar with excellent equivalents for the terms in question to countenance Mr. Jackson's version. Beginners struggling with the Fifth Book may indeed be pleased to learn that they need not find renderings for the hard words; but even this natural joy will be marred, I should think, by such unsatisfactory pigeon-English as the following:—"A man is *δίκαιος* when he *δικαιοπραγῇ* of deliberate purpose". "Who is it whom he *ἀδικεῖ*?" "If the distributor give his judgment *ἀγνοῶν* he *οὐκ ἀδικεῖ κατὰ τὸ νομικὸν δίκαιον*."

J. A. STEWART.

IX.—NEW BOOKS.

[These Notes are not meant to exclude, and sometimes are intentionally preliminary to, Critical Notices of the more important works later on.]

Selections from Berkeley, with an Introduction and Notes, for the Use of Students in the Universities. By A. C. FRASER, LL.D., Professor of Logic and Metaphysics in the University of Edinburgh, Second Edition. Revised and Enlarged. Oxford: Clarendon Press, 1879. Pp. xlviii., 366.

The appearance of a new edition of Professor Fraser's *Selections from Berkeley* is a favourable sign of the interest now taken in the study of pure philosophy. Few writings are so well adapted as those of Berkeley for introducing the English student to the line of modern metaphysical thinking which finds its natural termination in Kant. With the assistance of the notes supplied by the editor, the student of Berkeley's writings can hardly fail to have his attention awakened to the nature and conditions of those speculative problems only dimly apparent in that writer. Nothing can exceed the fairness and judicial candour with which Professor Fraser points out the inadequacy of what are fundamental theorems in the Berkeleyan system—e.g., the doctrine of abstraction, the theory of external reality, and the theory of causality. The notes on these and other special subjects are most helpful. In the present edition it is possible to trace a more constant reference to later writers, such as Kant, than was previously given.

The Introduction has been re-written and re-arranged. In its new form it contains an accurate and lucid account of the development of modern thought from Descartes to Hume, sketching the history of the fundamental philosophic problem from its first statement to the point at which it passed into the hands of Kant. The student of Berkeley could not well have a more thorough introduction than is here supplied. Perhaps, as is natural, the editor assigns

a more important place in this movement to Berkeley than can fairly be granted to him. The entire novelty of Berkeley's question cannot, we are inclined to think, be altogether admitted. He did, undoubtedly, effect a great and important change in the mode of viewing certain philosophic problems, but it was through insistence on the necessity of applying the new analysis to all philosophic notions rather than through radical change in the method of analysis. In all fairness, too, it must be said, that the first statement of Berkeley's new principle, that by which he has taken a place in the historic sequence of modern thinkers, was by no means adequate to the problems left unsolved by Cartesianism, and was so modified in the course of Berkeley's own development as to assume an altogether new aspect. For our part we should be inclined to say that Berkeley is interesting, both in the history of philosophy and for the student, because he contains in an imperfect, half-developed manner, the germs of two important lines of later thinking. On the one hand his early empiricism, that by which he is historically known (*e.g.*, to Reid and Kant), is but an incomplete anticipation of Hume: while, on the other hand, the deeper, more spiritual side of his thinking, never in him worked out to its logical issues, but becoming in him always more prominent, is an imperfect, crude foreshadowing of the Kantian thought. Containing, thus, fundamental ideas which point in two directions, Berkeley is peculiarly well fitted as the subject of first studies on the history of modern philosophy. As above said, the notes in this second edition seem to recognise very fully the half-developed character of Berkeley's speculations, and point continuously to the quarters in which they find completion or rectification. [R. A.]

The Balance of Emotion and Intellect: an Essay introductory to the Study of Philosophy. By CHARLES WALDSTEIN, Ph.D. London: Kegan Paul & Co., 1878.

The aim of this work is "to bring forth the feeling for philosophy, the philosophical spirit and mood, *der philosophische Sinn*, as the Germans would call it"; the growth of such a spirit being hindered by the erroneous assumption that certain antitheses and incompatibilities obtain amongst important departments of culture, as, *e.g.*, between Emotion and Intellect, Fine Art and Science, and again between Common Thought and Science, Science and Philosophy. There is a tendency among some men of science "to favour Intellect, and to disfavour, if not actually to repress, Emotion"; whereas both powers are equally necessary, that to guide, and this to impel us to action. And as for Common Thought, Science and Philosophy, so far from being truly opposed to one another, they are merely, as Mr. Spencer observes, successive stages in the development of cognition. These and similar errors obstruct the formation of the philosophical mood; and the best way to dissipate them is to encourage and foster that mood as much as possible. Accordingly, the author says, "contrary to recently expressed views" (perhaps referring to a discussion in *MIND*, No. X.), "I found that the best means of

producing this mental attitude was to give a short history of philosophy". Such a history accordingly occupies the larger and central portion of the book. In order to make it useful to beginners, Dr. Waldstein has disencumbered it of technicalities and simplified it as much perhaps as the matter would permit. He tries to show how the History of Philosophy answers the great questions about "the mighty sum of things forever speaking," as they may (by a stretch of imagination) be supposed to arise in the mind of a youthful inquirer. At the close of the historical chapters, he says: "One of the most important of the results derived from the study of the History of Philosophy is a cultivation of intellectual sympathy, the power of transplanting ourselves into the different modes of thought of different individuals in different ages and climes, of thinking with and in others: and in thinking with others we learn to feel with others". The author then adds some observations upon the characters of various classes and nations, in so far as they are remarkable for deficiency or excess of intellect or of emotion; and ends with an appendix upon the emotional endowments of Germany and England, as illustrated by a comparison of their languages. Fortunately the result is unflattering to the only nation that does not love flattery ("being then most flattered" when told so!). But perhaps language is not the surest clue to feeling: other things equal, we might expect that nation to be richest in the language of emotion which had had least opportunity of venting it in action. Is not this a better criterion of the right balance of national character: Which nation needs least government?

[C. R.]

Philosophy: Historical and Critical. By ANDRÉ LEFÈVRE. Translated with an Introduction by A. H. Keane, B.A. London: Chapman & Hall, 1879. Pp. xxiv., 598.

This work is divided into two parts, the first of which passes in rapid review the various historical systems of philosophy from "the period of the cosmogonies" to Auguste Comte and Herbert Spencer. Its five chapters deal respectively with Primitive Times ("from the Thirtieth or Fortieth to the Seventh Century" before Christ); Antiquity; the Intermediate Period; the Renaissance; and Modern Times. The second part consists of a *résumé* of the author's own views, which resolve themselves into a crude materialism, not unlike that of Dr. Johnson, grafted on to the evolution theory. M. Lefèvre criticises the various philosophies with which he deals from his own standpoint. His account of each system is meagre in the extreme—he gives just one page to Berkeley and four to Hume—and his judgment is much more influenced by the tendency of any philosophy as regards religious belief than by its real content. Altogether the work was hardly worth writing in France, and certainly not worth translating into English. It is characterised throughout by a fierce opposition to clericalism and Christianity, often expressed in a most offensive tone, and always colouring both the critical and the positive part of the book. The polemical style of the first part is fatal to the

exegetical value of the work, which, for the rest, displays no great personal acquaintance with the authors criticised, except those who have written in French. The second part—divided into four chapters on the Universe, the Living World, the Intellectual Mechanism in the Individual, and the Intellectual Mechanism in Presence of the Universe and Society—contains a brief sketch of evolution, physical, organic and social, but nothing which the English reader cannot better obtain elsewhere. It is greatly disfigured by its dogmatic materialism, and its absolute denunciation of any attempt to investigate the relations between subject and object,—the latter apparently a legacy of Comtism, which in other matters the author disavows. The translation is very indifferently performed, and often fails to bring out or even positively distorts the meaning of the original. Altogether a feeble declamatory work, weakly written and badly translated. [G. A.]

Chapters on the Art of Thinking: and other Essays. By the late JAMES HINTON. With an Introduction by Shadworth Hodgson. Edited by C. H. Hinton. London: Kegan Paul, 1879. Pp. 393.

This volume, edited by the lamented Hinton's son and introduced by his intimate friend Mr. Sh. Hodgson, is composed partly of manuscript papers left in a form ready for publication, partly of essays previously published in literary or scientific periodicals. The "Chapters on the Art of Thinking," hitherto unpublished, are five in number (pp. 15-46) and date from 1872. The majority of the Essays have already seen the light in one way or other, but they are now most fortunately brought together. Particularly welcome, by the side of two other articles (republished) of an ethical character, is the appearance of the exquisite little essay "Others' Needs," formerly not to be had without difficulty in the shape of an anonymous tract. Besides four more properly "Scientific Papers," the volume also includes under the title of "Recollections" some records, from different sources, of Hinton's conversations or rather monologues on favourite topics. Of the volumes (printed for his own private use) containing his thoughts in the fruitful years from '59 to '63, and again from '69 to '70, no use has been made in the present collection, but the hope is held out that at some future time something of their contents may be made public. Mr. Hodgson, in his fine introduction, seeks especially to bring out a fundamental affinity of thought between Hinton and Coleridge.

The Metaphysics of John Stuart Mill. By W. L. COURTNEY, M.A., Fellow of New College, Oxford. London: Kegan Paul, 1879. Pp. 156.

"This book deals with some of the main metaphysical problems in Mr. Mill's philosophy,—the subjects successively discussed being 'Consciousness,' 'Body and Mind,' 'Primary Qualities of Matter,' 'Causation,' 'Necessary Truths,' and 'General Ideas'. In each of these the author attempts to prove the difficulties of Mr. Mill's Sensationalistic and Empirical position, contrasting it with the Idealistic solution of Kant. An Introduction, commenting on the possibility of Metaphysical progress, and an Epilogue, summing up the main characteristics of Mr. Mill's philosophy as standing half-way between the Sensationalism of Hume and the Scientific Empiricism of Spencer and Lewes, complete this little volume."

Superstition and Force. Essays on 'The Wager of Law,' 'The Wager of Battle,' 'The Ordeal,' 'Torture'. By HENRY C. LEA. Third Edition, revised. Philadelphia: Henry C. Lea, 1878. Pp. 552.

The first three of the Essays brought together under this somewhat fanciful title originally appeared in a greatly condensed form in the *North American Review*. In their book-form, all four have been added to in the present edition by a clearer indication than before of "the source in prehistoric antiquity of some of the superstitions which are only even now slowly dying out and which ever and anon re-assert themselves under the thin varnish of modern rationalism". The truly psychological spirit in which the author conducts a quite admirable investigation over a historical field of vast extent cannot be better displayed than in these words of his own :—

"The history of jurisprudence is the history of civilisation. The labours of the lawgiver embody not only the manners and customs of his time, but also its innermost thoughts and beliefs, laid bare for our examination with a frankness that admits of no concealment. These afford the surest outlines for a trustworthy picture of the past, of which the details are supplied by the records of the chronicler. It is from these sources that I have attempted, in the present work, a brief investigation into the group of laws and customs through which our forefathers sought to discover hidden truth when disputed between man and man. Not only do these throw light upon the progress of human development from primitive savagism to civilised enlightenment, but they reveal to us some of the strangest mysteries of the human mind."

De l' Intelligence. Par H. TAINÉ, de l'Académie Française. 3me Edition, Corrigée et augmentée. 2 Tomes. Paris: Hachette, 1878. Pp. 419, 492.

The present edition of M. Taine's psychological work (originally published in 1869, and shortly afterwards translated into English), while considerably extended, especially in the first or analytic part, is yet presented in a reduced form, which makes it a much handier book than before. The chief additions to the text are in the chapter on the Functions of the Nervous System, which is not only brought up to the level of the more recent investigations but contains in a new section (I. pp. 291-315) a rather elaborate speculation as to the mechanism of the thinking organ. M. Taine reprints as an appendix to Vol. I. the note "On the Acquisition of Language by Infants and by the Race" which appeared in the first number of the *Revue Philosophique*, and of which the first half was translated in MIND VI., calling forth further contributions by Mr. Darwin and Mr. Pollock to the natural history of infant mental life. He also appends to Vol. I. two other psychological records—one a case of "progressive hallucination with reason intact," and the other a case of "acceleration of the play of the cortical cells," supporting the view that in special circumstances, like what is reported of people saved from drowning, the flow of representation may be indefinitely quickened. Vol. II. has added to it a note "On the elements and formation of the idea of the Ego," as disclosed in the pathological

cases described by Dr. Krishaber under the name of "cerebro-cardiac neuropathy" (Paris: Masson, 1873). The general preface to the work is also considerably extended, including a striking statement of the chief desiderata of psychological science at the present time, and a summary of what M. Taine considers his own positive contributions to it. It cannot be said that he in the least exaggerates the amount or value of his performance. Though the merits of his book have never been overlooked since it made its mark on first appearing, it has hardly even yet received all the praise it deserves for its admirably methodical exposition and for its firm scientific handling of many of the most perplexed psychological questions.

Petit Traité de Morale à l'usage des Écoles primaires laïques.
Paris: Au bureau de *La Critique Philosophique*, 1879. Pp. 195.

The two first parts of this work ('Morality of Childhood,' 'Morality of Adults') have already appeared in the *Critique Philosophique* from time to time since 1875; not so the third part ('General Morality'). The basis of the work is supplied by Dr. W. Fricke's *Sittenlehre für confessionslose Schulen* (Gera: Strebel, 1872), of which an English translation exists under the title of *Ethics for Undenominational Schools* (London: Grant, 1872); but, while seeking to incorporate all they could from their German predecessor, MM. Renouvier and Pillon have freely altered the order and treatment of topics "wherever this was necessary in order to substitute the methods and ideas of criticism for vaguer doctrines of mixed origin and imperfectly rationalised". "It is not yet in the country of Kant (they add) that the morality of Kant is best understood." In particular, they have sought "to strengthen the principle of Right, to set rights over against duties wherever this was necessary, to complete or point the definitions and precepts, and this progressively in such a way as to end by binding together the fundamental notions after the manner of less elementary works". Like Dr. Fricke's original book, the present one is sent forth as a first draft to be filled in and amended by the co-operation of all who are concerned in the education of the people on a basis of rational morality. It is fresh evidence of the zeal and insight with which MM. Renouvier and Pillon continue their philosophical crusade.

La Science positive et la Métaphysique. Par LOUIS LIARD, Professeur de Philosophie à la Faculté des Lettres de Bordeaux. Ouvrage couronné par l'Académie des Sciences morales et politiques.
Paris: Germer Baillière, 1879. Pp. 485.

The object of this work, inspired by the formal teaching its author received from M. Lachelier at the École Normale, as also by the ideas of M. Renouvier, M. Ravaisson and M. Secrétan, is to show that Metaphysic, which once stood for all human knowledge, has not been so displaced by the special sciences as that beyond their results there is nothing left to occupy the mind. Beyond *phenomena* men must still seek to know the *absolute*, beyond the *conditions* the *reason* of things; and Metaphysic has thus an inalienable province. But it

is not its proper function to aim at being a science of first principles and first causes, as the ancient philosophers dreamt of, and as generation after generation of thinkers have ever since vainly attempted to prove it. The Metaphysical notion of the Absolute is a purely moral one, as Socrates alone among the ancients divined, and as Kant, among the moderns, was first able clearly to establish.

Étude sur la Vie et les Œuvres philosophiques de G. Berkeley. Par A. PENJON. Paris: 1878. Germer Baillière. Pp. 448.

M. Penjon, who has already in the pages of the *Revue Philosophique* shown competent acquaintance with more recent English speculation, gives in the above work a clear and succinct account of the life and philosophy of the writer who in many respects has had the greatest influence in determining the course of English thought. For the facts of Berkeley's life, and for the greater portion of the brief summaries of Berkeley's works, M. Penjon, as he amply acknowledges, is indebted to the careful labours of Professor Fraser. So far as English readers are concerned, indeed, the *Étude* has little or no value, as it merely reproduces, often *verbatim*, what can be had in Professor Fraser's volumes. The conclusion (pp. 370-448), containing M. Penjon's contribution to the discussion of the questions raised by Berkeley, consists of seven brief sections or articles of rather too slight texture to require special notice. At the same time full credit must be given to him for the ability and completeness with which he has presented Berkeley to French readers.

Geschichte der neuern Philosophie. Von KUNO FISCHER. Erster Band, Erster Theil. Dritte neu bearbeitete Auflage. München: Bassermann, 1878. Pp. 440.

In publishing a third edition of the first volume of his now well-known *History of Modern Philosophy*, the author reminds us that, since he published the second edition of the same volume, he has carried forward the exposition beyond Kant to Fichte and then to Schelling. Now he stands face to face with the last part of his great task—the treatment of Hegel and the later developments of philosophy down to the present day. In the new edition here begun, the work, which has grown to a size not originally intended, will be brought as far as possible into a more compressed shape, partly by the adoption of a different type, but also by a systematic revision of the whole exposition. The compression will make room, where necessary, for extensions; as, in the present first part of Vol. I., there is a considerable increase in the General Introduction dealing with earlier philosophy, especially the sections on the periods of the Renaissance and of the Reformation. Account has also been taken of the latest new researches bearing on Descartes. It is needless to remark on the merits of Fischer's treatment of Descartes. The volume has become indispensable to the student of modern philosophy, and, being no longer to be had in the first or second editions, is greatly to be welcomed in its new and improved form.

Studien über das Bewusstsein. Von Dr. S. STRICKER, Universitäts-Professor in Wien. Wien : Braumüller, 1879. Pp. 99.

Dr. Stricker, the eminent physiologist, publishes here in a separate form for general readers his studies on Consciousness, begun with reference to pathology and already embodied in a larger work addressed to medical men. The studies here reproduced are all of a character to be understood without professional training, and deal with common questions of psychology, only taken up with the freshness of spirit that is apt to mark the inquiry of really good scientific heads when they turn from their own to a related department of science. The little work is brimful of suggestive observations—not least suggestive where they might perhaps be modified by further inquiry. In particular, should be noted the author's peculiar view that every sensation has bound up originally with it a double consciousness of locality—as occupying a definite place centrally (in the head) and a definite place peripherally. “Seated (he says) in the head, Consciousness knows—apart from all exercise, from all other indications and on the very first excitation—that something is going on at definite places of the peripheral nerves; and this amounts to saying that Consciousness reaches from the brain into those nerves as its outposts.”

Metaphysik : Drei Bücher der Ontologie, Kosmologie und Psychologie. Von HERMANN LOTZE. Leipzig : Hirzel, 1879. Pp. 604.

This volume is the second of the series in which the author is embodying his System of Philosophy. The first volume, which appeared in 1874, contained his Logic, and the present one includes the whole of his Metaphysic. In its latest form his metaphysical system has diverged even more widely from Kantianism than was the case in the book published under a similar title in 1841; and all the traces of Hegelian influences, which were then apparent, seem now to have disappeared. The volume, as its title indicates, is divided into three books, which deal with the Relations of Things (Ontology), the Course of Nature (Cosmology), and Spiritual Existence (Psychology) respectively. The remaining volume of the series will treat of Practical Philosophy, *Æsthetics* and Philosophy of Religion.

Die Schein-Bewegungen. Von Prof. Dr. J. J. HOPFE, Doctor der Medicin et Philosophie. Würzburg : Stuber, 1879. Pp. 212.

A remarkably thorough investigation, from the physiological point of view, of the extraordinary variety of *apparent* movements which we are liable to experience in the way of perception. These are grouped by the author round the impressive case where a river-bank seems to move to the spectator standing upon it; the explanation of this case, which can be distinctly studied in connexion with the muscular and sensitive structure of the eye, leading on to an understanding of the others, both those that are related and those that are different in character. He touches but slightly the apparent movements of hallucination, and leaves aside, for want of space, the apparent movement of double images; but otherwise almost the whole multitude

of cases is treated. Information is given as to the earlier attempts at explanation; and the author ends with a short excursus into the general theory of knowledge viewed in the light of his particular research. The investigation is one of that *special* kind that is most wanted in the present state of psychological science.

Monaden und Weltphantasie. Von J. FROHSCHAMMER, Professor der Philosophie in München. München: Ackermann, 1879. Pp. 181.

This work is a sequel to the author's *Die Phantasie als Grundprincip des Weltprocesses* (1877), critically noticed in MIND VI. The first part is a short re-exposition of the main ideas of that book, intended to remove misunderstandings. The second part is an exposition and criticism of the various modifications of the doctrine of Monads from Leibnitz through Herbart to contemporary philosophers like J. H. Fichte, Carrière, Ulrici, and contemporary men of science—Preyer, Nägeli, Häckel, Zöllner. In the author's former book this line of "monadological or individualistic" speculation received less attention than the other line of more properly "monistic or dynamical" thought which, in the manner of Spinoza, seeks to account for the variety of phenomena from the absolute unity of Substance. The author's own position in the middle is—that true monistic explanation, that is to say, of *real* individuals from a single principle, is to be had only upon the assumption of "Phantasy" as that principle.

Analisi fisiologica del Libero Arbitrio Umano. Del Dottore ALESSANDRO HERZEN. Terza Edizione. Firenze: Bettini, 1879. Pp. 271.

Professor Herzen's work first appeared as little more than a pamphlet, and was then considerably extended in a second edition (1870). Still farther extended and revised, it next appeared in a French translation in 1874, under the title *Physiologie de la Volonté* in Baillière's 'Bibliothèque de la Philosophie Contemporaine'; and the present third edition is a reproduction of this last in Italian. Two articles by the author are appended (one a polemic against spiritualism in the form of a letter to Professor Luigi Ferri, the other on some modifications of individual consciousness); besides a statement of the theory of Responsibility based on the negation of free-will, extracted from a work by Dr. Enrico Ferri.

Sulla Dottrina psicologica dell' Associazione. Saggio storico e critico. Di LUIGI FERRI, Professore di Filosofia nella Regia Università di Roma. Roma: 1878. Pp. 92.

A dissertation republished from the proceedings of the Accademia dei Lincei (16 June, 1878). The author divides his compendious survey of Associationism into three parts, devoting attention mainly to the work of English thinkers, but making side-references, where necessary, to others. The first part traces the doctrine from Hobbes and Locke to Hartley; within which period (between Hume and Hartley) falls the work of the Bolognese Francesco Maria Zanotti, *Della*

forza attrattiva delle idee (1747). In the second part, "the intermediate period of criticism and restriction," beginning with Reid and prolonged in Stewart and Hamilton, is briefly characterised, with side-reference to the Italians Galluppi and Rosmini, and to Herbart and Condillac. The third and largest part deals somewhat minutely with the two Mills, Professor Bain, and Mr. Spencer. Finally, in an epilogue, the author expounds his view of the imperfections and shortcomings of Associationism, even at its best, as a philosophical theory of knowledge.

X.—MISCELLANEOUS.

Professor William Kingdon Clifford died of consumption at Madeira on the 3rd March, in his 34th year. None of those who took leave of him two months before, when he sailed for the warmer climate that might lengthen out his days a little, can be surprised that the end has come so soon; yet none can have so reconciled themselves to the inevitable as to hear of it at last without the most poignant regret. It is calamitous that this splendid intellect should cease when it had just come near to satisfying itself of the range to which its proper activity might extend. While nobody could come into any sort of personal contact with Clifford and escape the charm of his nature—a charm that won him troops of devoted friends, nobody could become really intimate with him and not recognise the presence of one of those rare minds fit for the exactest work of science yet endowed with the habitual elevation of view that can only be called philosophic. One dwells upon the character of the man, because his work has been fated to remain for the most part a promise. Even in mathematics which had his first devotion, his fame lies less in actual performance than in the sense which the greatest of his contemporaries had of his almost unlimited faculty. But everything he did accomplish in that field has the stamp of genuine originality on it; while nothing could surpass the skill with which he interpreted to his countrymen those newer geometrical conceptions that have sprung from the fertile brains of the philosophical mathematicians of Germany. In philosophy he had a passion for clearness; he had also a singular docility and candour. And if the note of the philosopher is to seek for the highest and widest truth with a fixed regard to the guidance of human conduct, surely no one was ever more a philosopher. To those who saw him passing calmly through suffering into the unknown, with brain as marvellously active and heart as full of the enthusiasm of humanity as in the day of his strength, he leaves the memory of a bright and dauntless spirit whose like they will hardly meet again.

He was born at Exeter on the 4th of May, 1845, and, after being at school there, was educated at King's College, London, and Trinity College, Cambridge. His mathematical studies were mixed with classical learning, before they became supplemented by philosophy.

Impatient of the academic routine at Cambridge, he yet missed only the very highest honours at the end of his student-career in 1867, and was soon afterwards elected Fellow of his College. From being assistant-tutor at Trinity he passed in 1871 to the chair of Applied Mathematics and Mechanics in University College, London, which he held till the time of his death, though he was disabled from lecturing for about a year before. He was made Fellow of the Royal Society in 1874. The *Royal Society Catalogue* mentions 16 mathematical papers which he published between 1863 and 1873, besides the printed report of the lecture "On some of the Conditions of Mental Development" delivered at the Royal Institution in 1868,—the first of the series of brilliant addresses or articles on scientific or philosophic subjects by which he has become most generally known. The more important of these are the following: "On the Aims and Instruments of Scientific Thought" (*Macmillan's Magazine*, 1872); "Body and Mind" (*Fortnightly Rev.*, 1874); "The Ethics of Belief" (*Contemp Rev.*, 1875); "Philosophy of the Pure Sciences" (*Contemp Rev.*, 1874, 1875, *XIXth Century*, March, 1879); "On the Nature of Things-in-themselves" (*MIND IX.*). His *Elements of Dynamic*, Part I. (Macmillan) appeared in 1878. Shortly before his death, at a meeting of his friends at the Royal Institution (the President of the Royal Society in the chair), it was resolved, in view of his enforced retirement from active work, to make "public recognition of his great scientific and literary attainments" by raising a fund to be placed in the hands of Trustees for the benefit of himself and his family. Subscriptions will still be received for his wife and two children by Messrs. Robarts, Lubbock & Co., Lombard Street, E.C. (to be paid to the Account of "The Clifford Testimonial Fund").

Prof. Campbell Fraser, of Edinburgh, has undertaken to prepare for the Clarendon Press a library edition of Locke's *Essay concerning Human Understanding*, with an Introduction, Memoir, Excursuses, &c., in two octavo volumes, uniform with his edition of the *Works* of Bishop Berkeley. Locke's *Essay* has been many times reprinted since its first publication in 1690, but the want of an annotated edition has been made matter of reproach to Englishmen by critics and historians of philosophy. It is now proposed to supply this deficiency, under the auspices of Locke's own University of Oxford, in an edition with a revised and interpreted text, and with discussions connecting Locke, for the modern reader, with his contemporaries and predecessors, as well as with the later course of thought in Europe and America. Prof. Fraser will be obliged to anyone who will send him special information on the subject, to 20 Chester Terrace, Edinburgh.

The Editor of *MIND* has undertaken to write for Messrs. Macmillan's series of *Elementary Lessons in Science* a short manual of Psychology, which, while forming an introduction to the study of the Science generally, will keep specially in view its practical bearings on the work of Education.

As we are going to press, M. Ribot's promised work *La Psychologie Allemande Contemporaine* (Germer Baillière), dealing with the Experimental School from Herbart to Wundt, has come to hand. It will receive due notice later on.

A new two-monthly journal has begun to appear at Oporto under the title *O Positivismo*, understanding Positivism chiefly in the sense of Comte as interpreted by M. Littré, and covering very much the same ground as the long-standing French review *La Philosophie Positive*.

Dr. Julius Frauenstädt, the devoted disciple, editor, biographer and expositor of Schopenhauer, died at Berlin on the 15th January, in his sixty-sixth year.

Busy St. Louis in the far West finds even the *Journal of Speculative Philosophy* not speculative enough or not philosophical enough for its taste, and means to have another quarterly periodical—really and entirely devoted, this one, “to the advocacy of Philosophy in its actual and ideal comprehension”. It will be called *The Philosopher* (English agents, Trübner & Co.), and the spirit of it may be gathered from the following sentences in its prospectus :—

“It is a lamentable fact that the current thinking discusses the ideal as scientifically invalid, and exults in the repudiation of all knowledge not exclusively derived from the senses. The very term, Idea, together with its content, has suffered degradation, even unto perdition, in the atmosphere of human sense. It is necessary that Philosophy itself, the ‘Science of Sciences,’ be rescued from its oblivion in the sensuous consciousness of the age, and restored to its own peculiar and distinctive sphere—the Intelligible Order—from which the physical world and all sensible things are constituted—in which Nature and all true Science ground their procedure.

“At the present time, though there are various journals which give more or less attention to the presentation and discussion of philosophical speculations and systems, there is none specially devoted to this aim, and this vacant niche in periodical literature *The Philosopher* proposes to fill. It will be principally, therefore, the exponent of Platonism and Mysticism, the organ of communication for those of our generation who are disposed to the study of Divine Philosophy, and the vehicle of the profoundest thought of this and past ages.”

The Rev. J. Fordyce of Great Grimsby sends the following :—

“In a work on Theism by the Rev. E. R. Conder, M.A. (*The Basis of Faith*, being the Congregational Lecture for 1877: Hodder & Stoughton), there is a chapter on the Nature and Validity of Knowledge which has not, so far as I know, been examined critically by any of our British philosophers. The theological character of the book may have something to do with its being overlooked. This chapter is devoted to Metaphysics, and has an independent character and value, though of course related to the book. In order that some of the readers of *MIND* may be tempted to examine and discuss Mr. Conder's theory, I give his concluding summary. He claims to have ‘made good the following theses’ :—

(1.) That human knowledge, being dependent for development on language, imitation and instruction, is collective; implying in its very existence the mutual action of at least two minds.

(2.) Consequently, that no criticism of knowledge can be valid which proceeds from the standpoint of a single isolated mind.

(3.) That the Relativity of Knowledge involves a fourfold relation : (a) of each mind to outward nature, (b) of nature to each mind and all minds, (c) of the parts and elements of nature to one another, (d) of human minds to each other.

(4.) Consequently, that any doctrine of the Relativity of Knowledge which takes account solely of the relation of the Subject to the Object, or of Reason to Phenomena, must be so defective as to be virtually false.

(5.) That the Relativity of Knowledge in place of being any impediment, disability or limitation to our knowledge, is that which renders knowledge possible, and on which its worth and truth depend.

(6.) That there are no 'things-in-themselves' out of relation to other things and to the First Cause.

(7.) That knowledge is composed of judgments ; the criteria of the judgments composing it being truth and certainty.

(8.) That our primary judgments have no logical subjects, but are predicated either of phenomena immediately present to consciousness (or represented in memory), or of those realities of which phenomena are natural signs ; namely, (a) self, (b) other selves or (c) causes, that is, forces or centres of force external to the mind.

(9.) That while a large part of our knowledge is conversant about phenomena, our ultimate judgments, in which the application or use of knowledge lies, respect the realities underlying phenomena, of which realities phenomena are the natural signs.

(10.) That the truth of judgments, and consequently the validity of knowledge, depends not on any resemblance of thoughts to things, but in a correspondence of relations, that is, in the facts of nature being so related to one another as our judgments affirm them to be.

(11.) That the Validity of Human Knowledge, subjectively assured by the imperative necessity we are under of trusting our own faculties (notably memory and reason), is objectively verified (a) by the results of our action, which pass from our control into the outward world, and fulfil or disappoint according as action is conformed to knowledge ; (b) by the independent course of nature, which fulfils all predictions based on correct calculation from true data.

(12.) Lastly, that Philosophic Scepticism has no valid foundation, but that if the phenomena or facts of the universe and human nature afford adequate evidence of a First Cause, there is nothing in the nature of knowledge to make us suspect this evidence."

Prof. A. Herzen writes from Florence :—

"I have already for some time been engaged in observations such as Mr. C. Evans (*MIND* XIII., p. 147) wishes to be made on arms and legs 'gone to sleep'. That some differentiation exists between the sense of touch and the thermal sense is, at present, owing to pathological observations, ascertained ; the two senses do not necessarily perish together, the one sometimes surviving the other ; but a very strange fact, which I am at present submitting to more rigorous experimental control, is the following. If I purposely put one of my arms into the most favourable position for its 'going to sleep,' and from time to time test its sensibility, I find that it loses almost *simultaneously* the faculty of feeling *tactile* impressions and impressions of *cold*, whilst it *continues* for a long time to feel the *heat* communicated by the contact of a warm body. This is in direct contradiction with Mr. Evans's statement that the foot which is asleep, although insensible to touch, is still sensible to cold. In due time I will inform you of the result of my experiments."

Mr. Grant Allen sends the following :—

"Bastian asserted, and Mr. Gladstone has given currency to the assertion, that the Burmese are generally unable to discriminate between blue and green. In order to test the truth of this statement, I obtained two pieces of blue and green paper, as nearly as possible alike in intensity of shade, texture, and other particulars, and only differing in colour properly so-called. These I enclosed in a letter to Mr. H. L. St. Barbe, British Resident at Mandalay, requesting him kindly to cut up the paper into small squares, and then ask several Burmese to match the pieces. Unfortunately, the answer did not arrive in time for inclusion in my lately-published work *The Colour-Sense*; but I give the particulars here as being of some general interest. Mr. St. Barbe says—

'I have tested casual strangers belonging to the following distinct races : Burmese, Shans, Chinese, Maingthas, Kachyens.

'I conducted the experiment in the way you prescribed and examined at least three of each nationality separately, and without a chance of communicating with their companions. The results were as follows :—

'All the "patients" were able to discriminate at once and without difficulty or hesitation between the two slips of coloured paper you enclosed, and to match detached pieces promptly and accurately. The Burmese and Shans have special names for the exact shade. They divide each prime colour into dark, medium, and light, and assigned the slips to the third division. The Chinese and Maingthas recognise (hereabouts) only two shades to a colour, while the Kachyens are altogether vague in their nomenclature. They easily distinguished between the two, but in many cases called the green "brown," and the blue "green." I am convinced that this arises, as you surmise, from a defect of language, not of vision.'

"After mentioning the fact that he had seen the same assertion in the *Spectator*, but had attached no importance to it, Mr. St. Barbe continues : 'The error may have sprung from the fact that, though the Burmese invariably call grass and vegetation green, they occasionally term the sky of the same colour, especially in their poetry.'

"I think we may conclude, therefore, that here, as in so many cases, the supposed deficiency of vision is really due to insufficient vocabulary."

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